The

Gardens' Bulletin

STRAITS SETTLEMENTS

Vol. IV AUGUST 1927 Nos. 4 & 5

IMPERIAL BUREAU
10 OCT 1927
OF MYCOLOGY

CONTENTS

BOTANICAL COLLECTORS, COLLECTIONS AND COLLECTING PLACES IN THE MALAY PENINSULA.

Page

By I. H. Burkill, M.A., F.L.S. 118

The Palms of British India and Ceylon (Review) .. 203

Relative Humidity in the Botanic Gardens, Singapore, 1926 205

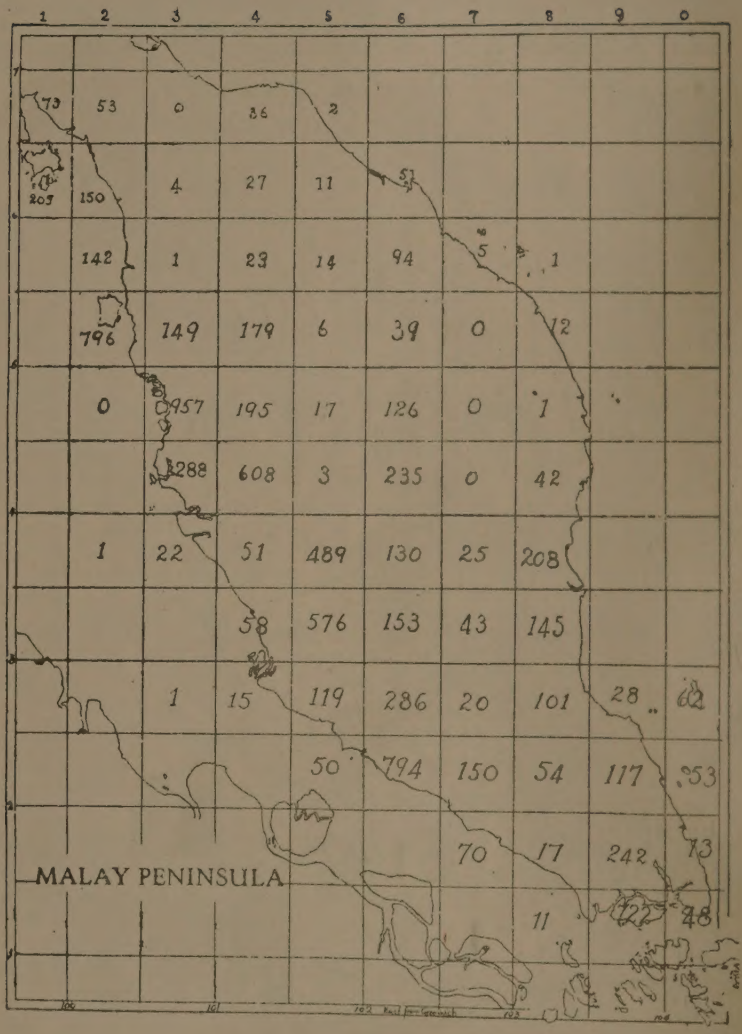
Rainfall in the Botanic Gardens, Singapore, 1926 .. 206

Rainfall in the Waterfall Gardens, Penang, 1926 .. 208

Summary of Rainfall, 1926 210

To be purchased at the Botanic Gardens, Singapore.

PRINTED BY FRASER & NEAVE, LTD., SINGAPORE.


1 2 3 4 5 6 7 8 9 0
A
B
C
D
E
F
G
H
J
K
L
M
73 53 0 86 2
205 150 4 27 11 51
142 1 23 14 94 5 1
796 149 179 6 39 0 12
0 957 195 17 126 0 1
288 608 3 235 0 42
1 22 51 489 130 25 208
58 576 153 43 145
1 15 119 286 20 101 28 62
50 794 150 54 117 53
70 17 242 73
11 22 48
MALAY PENINSULA

THE

GARDENS' BULLETIN

STRAITS SETTLEMENTS

Vol. IV. AUGUST, 1927. Nos. 4 & 5

BOTANICAL COLLECTORS, COLLECTIONS AND COLLECTING PLACES IN THE MALAY PENINSULA.

A review of the work so far done towards a knowledge of the plant-geography of Malaya.

By I. H. Burkill, M.A., F.L.S.

Mr. Ridley's *Flora of the Malay Peninsula*, south of 7° N. Lat. having been published and in regard to the higher plants the taxonomic foundation having been prepared thereby, it is appropriate that stock be taken at once of the knowledge that we possess upon the distribution of plants within the Peninsula. Towards that objective the following report is a first step. It brings out no scientific conclusions; but it indicates as concisely as possible in what measure the parts of the Peninsula have been botanised. A traveller touching at Penang will find in it the names of all who have collected plants in that island, and where their collections lie. The resident—let us say at Ipoh, but any name will serve—will obtain an estimate of how much remains to be done in the collecting of information within his circle. The administrator, who has power to direct collecting, will feel guided as to the way in which he can most profitably dispose his resources. The student, examining the herbaria which exist, will find in it a vade-mecum for the interpretation of too-often inadequate labels.

The report is in three parts:—(1) the collectors—an alphabetical list of all whose names are known to occur upon the labels of Malayan herbarium specimens, embodying sufficient biographical information for our purpose; (2) the collections, under which head the whole Peninsula is considered by squares of a half-degree of latitude and longitude —71 of them—and the work done in each set down; and (3) the collecting places, an index to the place-names which occur on the labels in herbaria, and at the same time an index to part 2.

There are two maps in the report. Upon the first the squares are all marked. These squares explain themselves, except that *1a* has been stretched a little to the west that all the Butang islands may be got into it; and square *0k* has been stretched a little to the east that Pulau Aor and

the islets near it may be included. A complete square of level land has a surface of about 1,225 square miles, a large area for our purpose, but to deal with subdivisions proves impossible. Of the 71, 28 alone have the full complement of land: the rest are all in part of sea.

The first map carries a figure in each square, the figure being the number of plants of the orders contained in the first volume of Mr. Ridley's Flora *, which can be proved to occur within each square. Add all the figures together and the total of 9,410 is obtained: but by reason of double and treble records for squares, the data compressed into the map by a very long way exceed this figure, and have been laborious to collect. That is why a halt has had to be called at the end of examination of the first volume, but the data on the data on the map do really suffice for the estimation of our knowledge in the form of a very approximate percentage.

The second map graphically indicates the percentages arrived at.

The lowness of these percentages as a whole is surprising. They read us a warning against hasty conclusions: they tell us how little we know; and that the square of Mount Ophir carries a figure so low as 12 and the square of Gunong Tahan one so low as 18, is material for consideration.

One more remark. The three Settlements,—Penang, Malacca and Singapore have received considerable attention, and a list of the places in them whereat plants have been collected would be long and extend Part 3 much; but to make one has not seemed necessary, for collectors' labels in regard to them have rarely proved misleading. Village names from these three Settlements, therefore, will only for special reasons † be found in the list. Good maps on a large scale are to be had and meet the rest of the need.

It is evident that orderly work can be based on the report.

In concluding these introductory remarks, Mr. Ridley, Colonel Kelsall, Dr. Gimlette and Dr. Foxworthy must be thanked for the kind way in which they supplied information.

---

* Begoniaceae had to be omitted from the count because the specimens of the Singapore herbarium are on loan and under elaboration in Germany.

† The majority of the special cases are where confusion may arise because the place-name is one of frequent occurrence; the following for instance are repeated from end to end of the Peninsula:—Ayer Hitam, or Black Water, Ayer Kuning, or Yellow Water, Bukit Putus, or the hill of the divide, Kota Baharu, or the new fort, Simpang Ampat, or cross roads, Tebing Tinggi or the upper bank (suitable for landing), Bukit Kayu Arang, or Diospyros hill, Pulai, or the Alstonia tree.

THE COLLECTORS.

A list as complete as possible of all whose names appear upon the labels of Malayan specimens in Herbaria.

ABRAMS, J.

A sergeant of Forest Guards, and later Forest Ranger, in Penang, 1888–1910, who obtained specimens for Curtis.

AHMED bin HASSAN.

Employed by the Botanic Gardens, Singapore, 1901– ; earlier collections numbered along with Ridley's; and later in Burkill's "Singapore Field Number" Series.

ALVINS, M. V.

Collector employed in the Forest Department of the Straits Settlements, 1884–1888 in Malacca, whence he journeyed into Negri Sembilan (Sungei Ujong State). His specimens are in the Singapore Herbarium and have been quoted as Cantley's Collector's or briefly as Cantley's. He numbered in the field.

ANDERSON, James Webster.

An Assistant Curator in the Gardens Department, Straits Settlements, 1910–1917, during which time he made small collections conserved at Kew and Singapore. He numbered in the field.

ANDERSON, Thomas. (1832–1870).

A surgeon under the Government of India, and from 1860–1868, Superintendent of Royal Botanic Gardens, Calcutta. On a journey to Java in connection with Cinchona culture, he found, in 1861, an opportunity of collecting plants in Singapore for the Calcutta Gardens. (Dict. Nat. Biogr. 1, 392).

ANNANDALE, Thomas Nelson. (1876–1924).

Superintendent of the Indian Museum, Calcutta and Director of the Zoological Survey of India. In 1899 he was attached to the Skeat Expedition, and in January and February, 1916, he revisited the same region. His collections of 1916 are in the Singapore Gardens, and were numbered in the field with Singapore Field Numbers. (Records Ind. Mus. Calcutta, 27, 1925, p. 1).

ARDEN, Stanley.

Employed in the Agricultural Department (1900–190). He sent plants to Singapore in 1902.

ASKEY, A. M.

A ranger in the Forest Department (1906–1922).

ASKEY, J. F.

A ranger in the Forest Department (1905–1910).

BAKER, Charles Fuller.

Professor and Dean of the College of Agriculture, Los Banos, Philippine Islands; in 1917 on the staff of the Botanic Gardens, Singapore; phanerogams in the Singapore Herbarium, and fungi widely distributed.

BARNARD, Basil H. F.

In the Forest Department, 1896– , chiefly in Perak, where he collected specimens of forest trees, etc.

BARNES, Warren Delabere. (1865–1911).

Of the Malayan Civil Service (1888–1910), and afterwards Colonial Secretary, Hongkong: conducted an expedition towards the mountain of Benom in 1900, and made a collection of plants upon a subsidiary summit. (Jour. Straits Branch Roy. As. Soc. No. 60, 1911, p. 4).

BAZELL, Clive.

Educational officer, stationed at Kuala Kangsar: sent to Singapore a small collection of plants from the summit of Gunong Bubu in 1923.

BECCARI, Odoardo. (1843–1920).

Naturalist and traveller in Malaysia (1865–1880). When in Singapore upon his way to Borneo, etc., he collected plants. His herbarium is in Florence. (Ann. del Mus. Civ. de Storia Nat. di Genova, Ser. 3, 9, 1921, p. 242).

BECHER, H. M.

A miner who lost his life in a flood in 1893 when exploring towards Gunong Tahan. He collected a little about Kuala Tembeling, Pahang.

BELL, L. M.

Municipal Engineer, George Town, Penang (1904–1920) and a member of the Committee for the management of the Waterfall Gardens, Penang; collected on Kedah Peak, in 1911, specimens which are at Singapore.

BELL, V. G.

Assistant Conservator of Forests, F.M.S. (1912–), since 1921 Conservator of Forests, Kedah. Sent plants from Kedah.

BEST, George Arnold.

Assistant Curator in the Gardens Department, Straits Settlements (1921–), collections in Singapore as part of the "Singapore Field Number" series.

BINSTEAD, Rev. Charles Herbert.

Paid a visit to Penang and Singapore in 1913 and collected mosses.

BLAND, Mrs. (Laura Shelford).

Wife of R. N. Bland, Resident Councillor, Penang, collected on the Taiping Hills in 1905 plants which are at Singapore.

BLOW, Thomas Bates.

Visited Singapore in 1904 and collected Characeae.

BORGES, V. P.

Extra Assistant Conservator in the Forest Department 1903–1924).

BOXALL, Richard.

Employed by the firm of Hugh Low and Co. to collect plants of horticultural value; he visited Kedah Peak and the Settlements about 1880.

BROOKS, Frederick Tom.

University lecturer in Botany, Cambridge. In 1914 temporarily in the Agricultural Department, and collected around Kuala Lumpur, Province Wellesley and elsewhere.

BRYANT, Alfred Thomas.

Of the Malayan Civil Service (1883–1918). Collected plants a little in the Dindings in 1890.

BURBIDGE, Frederick William. (1848–1905).

Traveller for ornamental plants in the employ of Messrs. Veitch; visited Singapore and southern Johore in 1877 and 1878; plants of his are at Kew. (*vide* Hortus Veitchii, p. 75, and his own "Gardens of the Sun").

BURKILL, Mrs. (Ethel Maud Morrison).

Wife of the following; collected and made drawings of Fungi for the Botanic Gardens, Singapore; numbered in the field.

BURKILL, Isaac Henry.

Director of Gardens, Straits Settlements (1912–1925); numbered in the field in a series labelled "Singapore Field Number," to which the whole Department and others contributed.

BURN-MURDOCH, Alfred M. (1868–1919).

Chief Forest Officer, afterwards Conservator of Forests, Federated Malay States and Straits Settlements, 1901–1914; collected forest trees in many places, and in 1913 contributed to the "Singapore Field Number" series. (Indian Forester, 40, p. 155).

C..... (H. C.).

A correspondent of the Botanic Gardens, Calcutta, who after having been in the Moluccas, sent plants from Penang to Roxburgh in 1798.

CANTLEY, Nathaniel. (–1888).

Superintendent of the Botanic Gardens Singapore (1880–1888), and of Forests (1885–1888); he collected plants in 1881 which are at Kew, and after 1881, which are in the Singapore Herbarium. Jour. Kew Guild, 1898, p. 37).

CHIPP, Thomas Ford.

Assistant Director, Royal Botanic Gardens, Kew; from 1914 to 1921, Assistant Director of Gardens, Singapore; collected in Singapore and elsewhere, chiefly Cryptogams.

CLERK, C. A.

Extra Assistant Conservator of Forests, Federated Malay States, 1910–1920. Collected in Negri Sembilan.

CRADDOCK, W. H.

Of the Burma Forest Service; worked on deputation in the Malay Peninsula, 1902–1903, and sent Pahang plants to Singapore.

CUBITT, George Eaton Stannard.

Conservator of Forests from 1915; specimens of forest trees collected in various places in his departmental herbarium and in the Botanic Gardens, Singapore.

CUMING, Hugh. (1791–1865).

Traveller and naturalist; visited Malacca and Singapore in 1839 and perhaps Singapore in 1835, when voyaging to and from the Philippine islands. His Malacca herbarium specimens have often been quoted in error as Philippine. Sets are in the herbaria at South Kensington and Kew; he sent living orchids both to the Calcutta Gardens and to the firm of Loddiges. (Dict. Nat. Biogr. 13, p. 295; Merrill in Phil. Journ. Science, 30, 1926, p. 159).

CURTIS, Charles.

Superintendent of Gardens and Forests, Penang (1884–1902); built up a herbarium in Penang which in 1910 was incorporated into that in the Botanic Gardens, Singapore. The numbers were put on to the specimens only after study.

DALHOUSIE, the Countess of (Christina Broun).

Wife of the 9th Earl and Commander in Chief in India, 1829–1832; collected in Penang, plants which were sent to Kew.

DE MORGAN, J.

A Civil Mining Engineer who made the first map of the Perak river. He collected a few ferns on Gunong Chabang which is over the Sungei Kerbau.

DE ZYLVA, E. R.

In the service of the Forest Department, Pahang, 1904–

DERRY, Robert.

Assistant Superintendent of Forests, Malacca (1885–1888); partly in Malacca, partly in Perak (1889–1903); Assistant Superintendent, Botanic Gardens, Singapore (1904–1908); Superintendent of Gardens and Forests, Penang (1908); Curator, Botanic Gardens, Singapore (1909–1913). In 1889 he sent plants to Kew; at various times he collected plants which are in the Singapore Herbarium.

DESCHAMPS, E.

Traveller; collected plants in easily accessible places near Penang and as far as Batu Gajah in 1900 and 1901, which were given to the Calcutta Gardens.

DESHMUKH, Gopal Bhikajee.

Field Assistant to the Botanic Gardens, Singapore (1918–1921); collected in and near Singapore.

DAUD.

In Herb. Wight are plants labelled "Singapore, Dawood." It is assumed that they came from a Malay collector named Daud, perhaps through Robert Wight's sea-faring brother.

DAUD, see TASSIM DAUD.

DOCTORS van LEEUWEN, W.

Director of the Botanic Gardens, Buitenzorg, Java; visited the Straits Settlements in 1920 and collected specimens chiefly cecidological, which are conserved at Buitenzorg.

DOWN, St. Vincent B.

Merchant of Singapore and afterwards of Sarawak; for many years on the Gardens Committee, Singapore; collected and gave plants to the Botanic Gardens, Singapore.

DRUCE, George Claridge.

Fielding Curator, Botanic Gardens, Oxford; visited Singapore in 1908.

DURNFORD.

A miner of Kuantan, who collected orchids and contributed them to the Singapore Gardens in 1889.

ELPHINSTONE, Sir Graeme H. D.

One of the earlier of the European planters in Perak; collected a little on the Taiping Hills, and his plants were given to Singapore.

ELLIS, William Gilmour.

Principal Colonial Medical Officer, Singapore; on the Gardens Committee in 1903, and collected plants in a few places.

ENGLER, Adolf.

Professor of Botany in the University and Director of the Botanic Gardens, Berlin; visited Singapore and Kuala Lumpur in 1905; collections presumably in the Berlin Gardens.

EVANS, I. H. N.

In the Museum Department, Federated Malay States; collected plants in many parts of Pahang in 1917, and also elsewhere. The collections were sent to Kew.

FARQUHAR, Colonel William.

As a Major, Resident of Malacca, later the first Resident of Singapore; employed a native to delineate the plants of the Peninsula, and submitted these drawings to Jack and Wallich. He climbed Mount Ophir and collected a little on it.

FEDDERSEN, Poul.

Planter and surveyor; collected orchids and other plants, sending specimens to the Botanic Gardens, Singapore (1916–).

FEILDING, J. B.

At the instance of the Government of Johore in 1892 visited the foot of Mount Ophir, and several places upon the coasts of the State, from the Kesang river round to the Endau and to the islands off the latter. Part of his journey was in the company of Lake and Kelsall, which accounts for plants having come from both Feilding and Kelsall from such places as Jambu Larang.

FERGUSON-DAVIE, Mrs. (Charlotte Elizabeth Hull).

Doctor of Medicine, wife of the Bishop of Singapore; collected plants in 1921 about Fraser Hill on the Main Range for the Singapore Gardens.

FERNANDEZ, Emanuel.

A collector employed by Griffith in Malacca while he was in Calcutta and presumably during his first residence in Malacca.

FINLAYSON, George.

Surgeon in the service of the East India Company; naturalist on the mission to Siam of 1821–23; collected plants which were distributed by Wallich in 1827–1832. (Dict. Nat. Biogr. 19, p. 32).

FLEISCHER, Prof. Dr. Max.

Visited Singapore, Kuala Lumpur and Penang in the year 1898, and collected mosses.

FLIPPANCE, Frederick.

An Assistant Curator in the Gardens Department, Straits Settlements, 1919– ; contributed to the "Singapore Field Number" series.

FOX, Walter.

In the service of the Gardens Department from 1878 to 1910, first in Singapore and then as Superintendent of Gardens and Forests, Penang; collected plants for Ridley.

FOXWORTHY, F. W.

Joined the Forest Department in 1918; collected in many parts of the Peninsula.

FURTADO, Cajetano Xavier.

Field Assistant in the Gardens Department, Straits Settlements, 1923– ; contributed to the "Singapore Field Number" series.

GAUDICHAUD-BEAUPRÉ, Charles. (1789–1844).

Traveller and collector; upon his second voyage round the world, 1835–1836, he touched at Singapore, Malacca and Penang, collecting a little, which is preserved at the Jardin des Plantes, Paris.

GIMLETTE, John D.

Surgeon in Government service, Malay States. Sent plants from Kuala Lebir, Kelantan, to the Singapore Gardens in 1904 and from Kota Bahru, Kelantan, from 1909.

GOLDHAM, C.

Educational Officer stationed at Ipoh and Kuala Kangsar, where he collected orchids, and from whence he sent specimens to Singapore.

GOODENOUGH, J. S.

Entered the Forest Service in 1888, and served in Malacca, Singapore, and as Forest Inspector in Selangor to 1901; collected forest trees in these places for Ridley.

GRIFFITH, William. (1810–1845).

Surgeon in the service of the East India Company; appointed civil surgeon of Malacca in 1841; recalled to take charge of the Botanic Gardens, Calcutta in 1842; returned in 1845. His herbarium is at Kew. (Dict. Nat. Biogr. 23, p. 240).

GWYNNE-VAUGHAN, David Thomas. (1871–1915).

Professor of Botany at Reading; in 1899 attached to the Skeat Expedition and from the southern Siamese Malay States travelled collecting towards Kelantan. His plants are at Kew and Cambridge. He numbered in the field. (Proc. Linn. Soc. London for 1915–1916, p. 61).

HAMID bin Mohd. Sah.

Forest Ranger. In Forest Department from 1907. Collected in many parts of the Peninsula.

HANIFF, Mohamed.

Entered the Gardens Department in 1890; and has collected in many parts of the Peninsula: later collections bear the "Singapore Field Number" series.

HASHIM bin Mohamed.

First in the Gardens Department and then Forest Ranger in the Forest Department, 1908– .

HAVILAND, George Darby. (1857–1901).

Surgeon and naturalist; resided at Singapore as Director of the Raffles Museum and visited the mouth of the Pahang river in 1890 and there collected. His Pahang collections are at Singapore. (Kew Bull. 1907, p. 197).

HAY, M. C.

In the Malayan Civil Service; stationed at Batu Pahat in 1924, when he collected economic specimens for the Singapore Gardens.

HENBREY, G. J.

Deputy Conservator of Forests, Federated Malay States, 1905– .

HENDERSON, Murray Ross.

In the Museums Department, Federated Malay States, 1921–1924; Curator of the Herbarium, Botanic Gardens, Singapore, 1924– . He numbered in the field.

HERVEY, Dudley Francis Amelius. (1849–1911).

In the Malayan Civil Service and Resident of Malacca (1882–1893), where he collected a herbarium which was given to Kew.

HILL, Henry Charles. (1852–1903).

Indian Forest Service, 1872–1903; Inspector General of Forests, India, 1900–1903; in 1899 deputed to report on the forests of the Malay Peninsula, for which purpose he travelled rapidly through the three Settlements in turn, then from the Dindings through Perak and Selangor, into Pahang via the Semangkok Pass to Kuala Lipis and down the Pahang river, thence to the Kuantan and Rompin rivers. Specimens gathered for identification were sent by him to Singapore.

HOBSON.

In the Survey Department; collected plants near Taiping and gave specimens to the Botanic Gardens, Singapore in 1909.

HOLMBERG, P. J.

In the Land Office, Malacca, and in 1891 in charge of the Malacca forests, when he collected forests trees for Ridley.

HOLTTUM, Richard Eric.

Assistant Director of Gardens, Straits Settlements, 1922– ; numbered in the "Singapore Field Number" series.

HOSE, E. S.

Son of the following; Malayan Civil Service, and from 1924–1925, Colonial Secretary, Straits Settlements; collected plants which are in the herbaria at Kew and Singapore.

HOSE, the Right Reverend George Frederick. (1838–1922).

Chaplain in Malacca, 1868–1873; in Singapore, 1874–1881; Bishop of Singapore and Sarawak, 1881–1908; collected plants, chiefly ferns; his collection of ferns is to be found at Kew. (Journ. Straits Br. Roy. As. Soc. 57, p. 1).

HOSE, Gertrude.

Daughter of the last named; collected grasses in various parts of the Peninsula.

HOSSEUS, C. Curt.

Traveller and collector; visited the Malay Peninsula in 1904 and collected plants, which presumably are conserved in the Botanic Gardens, Berlin.

HULLETT, Richard William. (1843–1914).

A schoolmaster in Singapore; a member of the Gardens Committee, and once in temporary control; collected a herbarium which he gave to the Gardens.

HUME, H. L.

Planter; attached to the Federated Malay States Museums during 1921, and collected plants in the neighbourhood of Kuala Lumpur.

HUNTER, Sir William. (1755–1812).

A ship's surgeon in the East, 1781, and in the employ of the East India Company, 1783–1812, and author of "Plants of Prince of Wales Island" printed in the Journ. Straits Branch, Roy. As. Soc. 53, p. 49. (Dict. Nat. Biogr. 28, p. 305).

ICHEBESTA, Rev. Father.

Missionary and linguist; collected some of the plants useful to the jungle folk of the Kedah-Perak boundary, for the Singapore Gardens, in 1924.

ISAAC, J. S.

A clerk in the Botanic Gardens, Singapore, who collected a little there under Ridley.

JACK, William. (1795–1822).

Surgeon in the employ of the East India Company and on the staff of Raffles; was in Penang and Singapore in 1819; his collections were lost in the "Fame," but he had sent duplicates of many to Wallich in Calcutta. (Journ. Straits Br. Roy. As. Soc. 73, 1916, p. 147).

JAGOR, F.

Traveller; author of "Singapore, Malacca, Java, Reiseskizze" 1866. He was for three months, April to July, 1858, in Malacca and for a much shorter time in Singapore. His collections are apparently conserved in Berlin.

JENSEN, Marius.

In 1901 collected plants in the neighbourhood of Singapore and Johore, which are preserved at Copenhagen.

JUPP.

Miner; climbed Gunong Stong in Kelantan and collected a few plants which he sent to Singapore.

KELSALL, Colonel J. H.

Royal Engineers; stationed as a Lieutenant in Singapore, whence he made several journeys of exploration, collecting plants for the Singapore Gardens.

KERR, Arthur Francis George.

Physician in the service of the Government of Siam, and in charge of the Botanical Section, Ministry of Commerce; collected in the Siamese Malay States, etc. He numbered partly in the field, partly after study.

KEUN, G. C.

Ranger in the Forest Department, 1906–1917.

KIAH bin Hadji Mohamed Salleh.

A plant collector employed in the Botanic Gardens, Singapore.

KING, Sir George. (1840–1909).

Superintendent of the Royal Botanic Gardens, Calcutta; sent in 1879 to Java in connection with cinchona culture; collected in Singapore, Johore, Malacca and Penang; plants at Calcutta. (Proc. Linn. Soc. London 1908–09, p. 42).

KINSEY, W. E.

Assistant and afterwards Deputy Conservator of Forests, Negri Sembilan (1907–); collected forest trees.

KLOSS, C. Boden.

In 1903 and 1907 on the staff of the Botanic Gardens, Singapore; then in the Museums Department, Federated Malay States; Director of Raffles Museum, 1923– ; collected plants in many places which are largely at Kew and also in the Singapore Herbarium.

KNIGHT, Valentine.

An assistant in the Raffles Museum, Singapore (1902–1922) who collected a little.

KUNSTLER, Hermann.

Collector employed by the Royal Botanic Gardens, Calcutta from 1880–1886 chiefly in Perak. Many of his plants are labelled "King's Collector." Some of his Kinta collections were mislabelled in Calcutta "Larut" and some of his 1886 collections were got in the State of Selangor, but mislabelled "Perak." He numbered after partial study.

KURZ, Sulpiz. (1833 ?–1878).

Employed by the Dutch Government in Java, and then (1864–1878) by the Government of India in the Botanic Gardens, Calcutta; in 1863 collected a little in Singapore. His collections are conserved in the Calcutta Gardens.

LAKE, Harry.

Miner and surveyor; explored Johore and with Kelsall in 1892 made a crossing of it from east to west, collecting on the way for the Singapore Gardens.

LEDOUX, J. A.

Planter of Kota Tinggi, in Johore, from the neighbourhood of which he collected plants and sent them to the Singapore herbarium in 1910 and subsequently.

LEWIS, T.

Assistant Resident Councillor, Penang; a friend of Griffith to whom he sent plants from Penang.

LIM BOON KENG, the Hon'ble Dr.

A member of the Gardens Committee, Singapore, collected a little in Singapore.

LOBB, Thomas. (1820–1894).

Employed by the firm of Messrs. Veitch (1843–1860) to collect plants of horticultural value; collected also dried plants, but these, which were sold in sets after determination, often bear incorrect localities. It is thought that the majority of the Malayan plants were got in Penang. (Hortus Veitchii, p. 41).

LONG, F. R.

In charge of the Hill Garden, Taiping (1908–1910) and from the hills he sent a collection of plants to Singapore.

LOW, Sir Hugh.

Resident of Perak (1877–1889), during which period he collected a little, sending his plants to Kew, and he encouraged collecting by others. See Agri. Bull., Straits and Federated Malay States, Vol. 4, p. 239.

LOW, Lieutenant-Colonel James. (–1852).

In the Madras Army, and later in civil charge of Province Wellesley; author of "A Dissertation on the Soil and Agriculture of Penang." He collected a few plants which are at Kew. (Dict. Nat. Biogr. 34, p. 183).

MACHADO, Alfred Dent. (. –1910).

Miner, then for a short time (1902–1903) on the staff of the Botanic Gardens, Singapore, and later a planter in Perak and again in Singapore. He made several small collections which are conserved at Singapore.

McGILL, Captain Hilton.

At sea, and later a planter in Kelantan (1904–1913), where he collected plants for Ridley.

McNAIR, Major John Frederick Adolphus. (–1910).

Colonial Engineer, Straits Settlements; author of a report on Singapore timbers; collected specimens of timber trees in Penang for Cantley, when, in 1881–1882, he was officiating as Lieutenant-Governor of Penang.

MAIN, T. Wilson.

In charge of the Hill Garden, Taiping in 1907 and Assistant Curator, Singapore Gardens, 1908–1910.

MAINGAY, Alexander Carroll. (1826–1869).

Army Surgeon, and from 1862–1867 in charge of the jail in Malacca, where he collected vigorously. His herbarium and notes on plants are at Kew. (Trans. Bot. Gard. Edinb. 11, p. 36).

"MAT."

A plant collector in Singapore (1888–1897), who visited Gunong Pulai and accompanied Beeker up the Tahan river.

MATTHEW, Charles Geekie.

Fleet-Surgeon; visited the Straits Settlements in 1904 and 1913, and collected ferns.

MILLS, G. R.

Planter; sent plants to Singapore from Batu Gajah in 1925 and subsequently.

MILSUM, John Noel.

In the Agricultural Department (1914–); collected plants which are at Kew.

MITCHELL, A. S.

Extra Assistant Conservator of Forests, Federated Malay States, 1907– .

MITCHELL, F. J.

Ranger in the Forest Department (1915–1922).

MOHAMED NUR bin MOHAMED GHOSE.

Employed in the Botanic Gardens, Singapore from 1913; collected in many parts of the Peninsula.

MOLLER, Hjalmar.

Visited Java in 1897 and when returning to Europe in the month of September collected mosses in Singapore and Penang.

MOORHOUSE, S. W.

In the Forest Department, Negri Sembilan, 1903–190 . He collected rotans for the Singapore Herbarium.

MOTLEY, James.

A miner engaged in Borneo (1852–1859); found an opportunity of collecting a little in Singapore. E. Barbour acquired the collections which he made to 1854, and sent them to Kew. (Journ. Straits Branch Roy. As. Soc. 79, 1918, p. 37).

MURTON, Henry James.

Superintendent, Botanic Gardens, Singapore (1872–1882); collected vigorously and sent specimens to Kew, but destroyed what he had retained in Singapore.

NANSON, William.

A lawyer of Singapore; interested in orchids, specimens of which he supplied to the Singapore Gardens.

NAPIER, Sir Walter J.

A lawyer of Singapore and Attorney General (1908–1909); on the Gardens Committee; collected plants for the Gardens from different places.

NEAL, G. E.

In the Forest Department (1911–1924); collected specimens of forest trees in Pahang.

NEWBOLD, T. J.. ( ).

Of the Madras Army, author of "A Political and Statistical Account of the British Settlements in the Straits of Malacca," 1839; transmitted plants from the summit of Mt. Ophir to Wallich in Calcutta.

NGADIMAN bin HADJI ISMAIL.

A plant collector employed in 1924– in the Botanic Gardens, Singapore.

NINGHUL.

A collector employed by Griffith; the editor of Griffith's "Posthumous Papers," spelling the name in various ways, took it to be a place name.

NONGCHI.

Employed as a gardener by His Highness the Sultan of Johore; in 1892 sent plants to the Singapore Gardens.

NORRIS, Sir William.

Recorder of Penang; a friend of Griffith, to whom he sent plants. Griffith's herbarium came to Kew, and Norris' own fern collection also reached Kew.

O'HARA, G. M.

In the Forest Department (1905–).

O'HARA, V.

In the Forest Department (1912–1926).

OXLEY, Thomas.

Surgeon and finally Senior Surgeon in the Straits Settlements (–1857); interested in economic plants, especially in Gutta-percha trees. About 1843 he sent plants from Malacca to Voigt in Bengal, at the moment when the East India Company had ordered the construction of a new herbarium in the Calcutta Botanic Gardens, evidently to replace what Wallich had just dispersed. He was said to possess a herbarium of 1,000–1,200 specimens in 1845. He climbed Mount Ophir in January, 1839 or 1840, and again in 1848, and sent plants to Kew from 1848 to 1852.

PEARS, Francis.

A planter of Johore who collected a little in the Muar valley in 1899.

PENNEY, F. Gordon.

In the Malayan Civil Service (1876–1906 or 1907); sent Pahang plants to Singapore in 1902.

PERRY, G. E.

Sent plants to the Singapore Gardens in 1920.

PHILLIPS, P.

Deputy Conservator of Forests, Federated Malay States, 1896–1925, collected in Pahang.

PHILLIPS, William Edward. (–1850).

For a long time in the service of the East India Company in Penang, and from 1819–1826 Governor; collected plants and gave them to Wallich, and also gave a collection to the Horticultural Society in London, which was passed on to Kew. (*vide* Jour. Malayan Branch Roy. As. Soc. N.S. 1, 1923, p. 8).

PINWILL, W. S. C.

A correspondent of the Royal Botanic Gardens, Kew, who sent thither a few plants from Malacca.

PORTER, George.

A member of the gardening staff of the East India Company's Garden at Calcutta, who accompanied Wallich to Singapore in 1822 and elected to remain in Penang, where he became a schoolmaster, and was put in charge of a Botanic Garden; he collected and sent plants to Wallich.

RACIBORSKI, Maryan.

Professor and Director of the Botanic Gardens, Lemberg, Galicia; collected in Singapore in 1899 upon his way from Java and sent plants to Kew.

RIDLEY, Henry Nicholas.

Director of Gardens and Forests, Straits Settlements (1888–1900); Director of Gardens (1901–1912); did not number in the field, but upon study.

ROBERTSON-GLASGOW, Charles Ponsonby. (–about 1900).

Visited Singapore and Perak in 1898 and collected fungi chiefly, which were sent to Kew; but the greater part of his collection seems to have been lost upon his death.

ROBINSON, Herbert C.

In charge of the Museum, Kuala Lumpur, then Director of Museums, Federated Malay States (1909–1925), collected and organised collecting, sending his collections chiefly to Kew.

ROSTADOS, E.

Miner and planter; collected plants about Bundi in South Trengganu in 1904 and sent them to Singapore.

ROXBURGH, William.

A son of William Roxburgh, the first Superintendent of the East India Company's Botanic Garden in Calcutta; collected living and dried plants for his father, in Penang, in 1802.

SANDERSON, A. R.

Sent plants to the Singapore Gardens in 1920.

SANDS, William Norman.

In the Agricultural Department (1920–); gave specimens in 1924 to the Singapore Gardens.

SCHIFFNER, Prof. Victor.

Of the University of Vienna; collected mosses in Penang and Singapore in November 1893. (Ges. zur Forderung Deutsch. Wissensch., Mitt. II).

SCHLECHTER, Dr. Rudolf. (1872–1925).

Of Berlin; travelled through Malaysia in 1901 collecting in February, between Penang and Singapore.

SCHOMBURGK, Sir Robert Hermann. (1804–1864).

Appointed British Consul in Bangkok in 1857, and on the way thither collected plants in Singapore which were sent to Kew. (Dict. Nat. Biogr. 50, p. 437).

SCORTECHINI, Rev. Father Benedetto. (–1886).

A missionary who came to Taiping from Australia in 1882; he collected diligently until his death, but considerably neglected to label his specimens. The collection went to Calcutta. In several places his name is wrongly given as Bertold, as for instance in *Oberonia Bertoldi*, King. (Rev. Mycol. 9; 1887, p. 123).

[SCOTT, John. (1838 ?–1880).

Curator of the Royal Botanic Gardens, Calcutta, is credited in books with collecting in Penang; but probably what he did was to cultivate plants brought to Calcutta from Penang by T. Anderson and others].

SEIMUND, E.

In the Museums Department, Federated Malay States; collected plants for H. C. Robinson.

SKEAT, Walter.

Of the Malayan Civil Service; organised in 1899 a scientific expedition, which collected in the north of the Peninsula. The plants collected on the expedition are at Kew and Cambridge.

SMITH, Christopher. (–1806).

Employed by the East India Company to introduce valuable plants into Penang (1796–1806), and from Penang he sent plants to the Gardens in Calcutta.

SMITH, Mrs. (Dr. Eryl).

Wife of Dr. Malcolm Smith in the service of the Government of Siam; collected plants at Fraser Hill, upon the Main Range in 1922.

SOUTH, F. W.

Sent plants to the Singapore Gardens in 1920.

STEPHENS, Arthur Bligh. (1855–1909).

Planter and then Forest Officer, Perak, later called Deputy Conservator of Forests (1897–1909); collected forest trees in Perak.

STEVENS, Hrolf Vaughan. (–1897).

Ethnologist; collected specimens of the useful plants of the wild tribes in Trengganu, which are conserved in Singapore. (Zeitschr. fur Ethnologie, 29, p. 235). See Wilkinson, Papers on Malay Subjects, Supplement (1910); The Aboriginal Tribes, pp. 3–5.

STOLICZKA, Ferdinand. (1838–1874).

Geologist in the employ of the Government of India; visited and collected in Penang and Singapore in August, 1869. (Memoir in Scient. Res. Second Yarkand Mission, 1886).

STRESEMANN, Dr. E.

A zoologist of the second Freiburger Molucca Expedition, 1910–1911, who took opportunity of visiting the main range of the Peninsula from Tapah and collected mosses.

T.....

The initials "G. T." (perhaps G. I.), together with the locality Singapore and the date December 1845, occur upon the label of a specimen in the herbarium of the Royal Botanic Gardens, Kew, to which has been added "G. Thomson." Who the collector was is unknown. Certainly it was not Dr. Gideow Thompson of Madras.

TASSIM DAUD.

Employed in the Singapore Gardens (1886–1895).

TENISON-WOODS, Rev. Julian Edmund.

A geologist, who visited Perak from Australia in 1884 and botanised with Scortechini.

VENNING, Alfred Reid. (–1908).

In the Malayan Civil Service (1893–1908); when Secretary to the Resident, Perak (1900–1903), residing in Taiping he collected plants which are conserved in Singapore.

VERAPHA.

A native collector employed by Griffith. The Editor of Griffith's "Posthumous Papers" mistook his name for a place name and spelled it in more than one way.

VESTERDAL, A. P. N.

Planter of southern Johore, where he collected plants and supplied specimens to the Singapore Herbarium in 1917. It is believed that he sent further collections to Copenhagen.

WALKER, Colonel George Warren. (–1844).

Collected in Penang and Singapore about 1837 plants which are at Kew and in the Natural History Museum, S. Kensington.

WALLACE, Alfred Russel. (1823–1913).

Naturalist; visited Singapore and Malacca in 1854, making zoological studies, and collected plants in connection therewith. He ascended Mount Ophir in July or August of that year. ("My Life," in two volumes, London, 1905).

WALLICH, Nathaniel. (1786–1854).

The second Superintendent of the East India Company's Botanic Garden in Calcutta (1815–1846); visited the Straits in 1822 and collected much in Singapore and a little in Penang. His collections were part of the Company's Herbarium distributed in 1828–1832. (Dict. Nat. Biogr. 59, p. 135).

WATSON, J. G.

At first in the Agricultural Department and then a Forest Officer in the Peninsula (1913–), in which capacity he collected in Johore and elsewhere.

WAWRA von FERNSEE, the Ritter Heinrich.

Surgeon in the Austrian Navy; travelled round the world in attendance upon two German princes and collected on brief visits to Singapore and Penang. His collections were listed in 1883–1888 in his "Itinera principum S. Coburgi, Die botanische Ausbeute von der Reisen ihrer Hoheiten der Prinxen von Sachsen-Coburg-Gotha."

WERNER, Dr. E.

Visited Penang in 1907 and a part of the mainland which he calls "the hills of the Sakai," collecting a few mosses.

WESTERHOUT (probably J. B., Assistant Resident of Malacca).

A friend of Griffith, who brought plants to him.

WHITE,.....

Chaplain of Singapore about 1841; collected plants and gave them to Cantor.

WIGHT.

A brother of the botanist, R. Wight. He visited Malacca and collected a few plants for him.

WILLIAMS, G.

Planter of Siliau in Negri Sembilan, where he studied orchids.

WINKLER, Hubert.

Professor of the University of Breslau; visited Singapore and Gunong Angsi in 1908, and collected plants which are preserved at Breslau.

WOLFERSTAN, Littleton Edward Pipe.

Of the Malayan Civil Service (1889–191); collected plants in the Dindings when stationed there in 1900.

WOOLDRIDGE, Theo. A.

Of Penang about 1893, collected living orchids through native agents.

WRAY, Leonard.

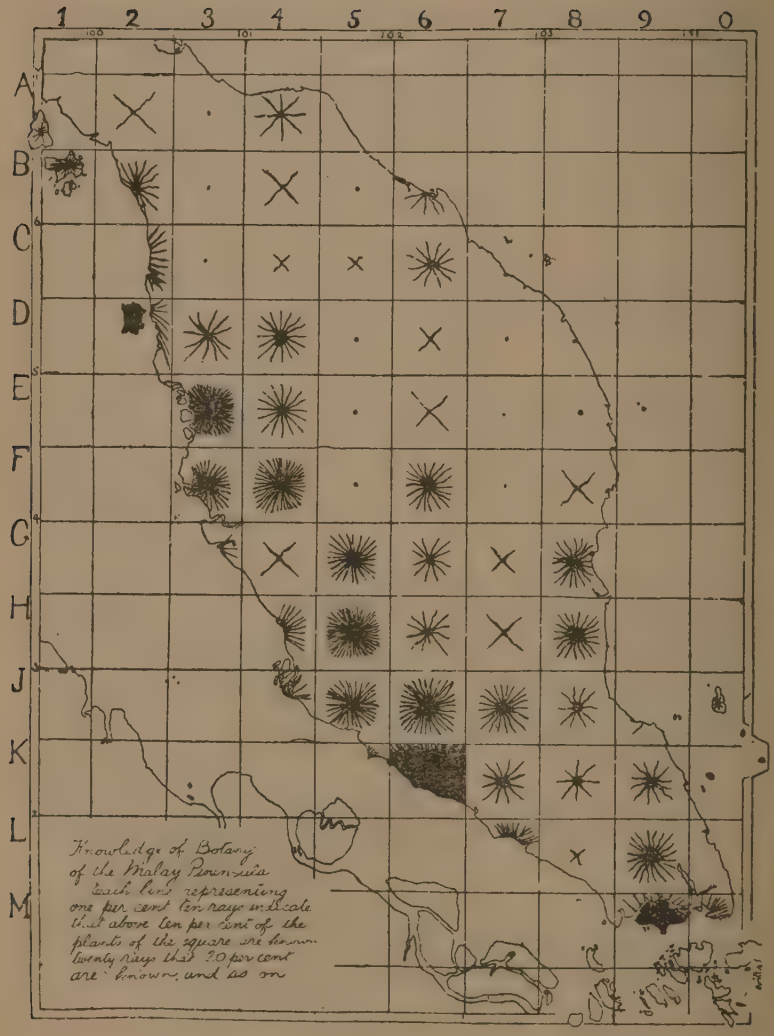
Superintendent of the Hill Garden, Taiping, 1881, and Curator of the Perak State Museum, 1883–1908, Director of Museums, Federated Malay States, 1905–1908; he made a considerable herbarium, which was worked up in Calcutta, where a complete set may be. The part he retained is now in Singapore. His father of the same baptismal name, resided in the Peninsula; therefore he commonly appended " junior " to his name.

YAPP, Richard Henry.

Professor of Botany, Birmingham University; in 1899 attached to the Skeat Expedition. His plants are at Kew and at Cambridge.

YEOB ABDUL RAHIM.

In Forest Department, Federated Malay States, and later in Johore. Collected extensively in various parts of the Peninsula, 1916–


1 2 3 4 5 6 7 8 9 0
A
B
C
D
E
F
G
H
J
K
L
M
Knowledge of Botany of the Malay Peninsula
Each line representing one per cent ten rays in scale that above ten per cent of the plants of the square are known twenty rays that 20 per cent are known, and so on

THE COLLECTIONS.

A statement of the collecting done in all the parts of the Malay Peninsula south of the seventh degree north, considered by squares of thirty minutes, as upon the map preceding.

SQUARE *1a.*

All the land in this square is Siamese, and is partly insular, partly peninsular. For convenience a liberty has been taken in extending the square westward a slight distance in order that all the islands of the Butang group should be brought within it. Thus extended it comprises from west to east Pulau Rawei, Pulau Adang, Pulau Tengah, the considerable Pulau Terutau, and many attendant islets; along with about 500 square miles of the Siamese administrative circle of Puket (State of Setul). It is recorded of this Siamese province that in 1780 it had ricefields back to twenty miles from the coast and plenty of cattle.

The western islands have been visited by one botanist only, and each for no more than a day or two. This was in the year 1911 when Ridley went successively to Pulau Rawei (April 20th–21st), Pulau Adang (April 21st), Pulau Nipis (April 22nd), and Pulau Tengah (April 23rd). An account of the visit is to be found in the Journal of the Straits Branch of the Royal Asiatic Society, No. 61, p. 45.

The island of Terutau has been visited several times. Curtis was there in the months of July and August, 1888, touching on this occasion only at Telok Wau (misprinted Noh) which is upon the south coast and for a few hours only (Rep. Forests, S.S. for 1888, appendix F). He visited Terutau again in July 1889 (Rep. Botanic Gardens for 1889, p. 18). In March, 1892 he reached Terutau for the third time, and in February, 1899, for the fourth. Then in November, 1901, he voyaged, as he records (Rep. Botanic Gardens for 1901, p. 21), fifteen miles further north than he had been upon any of the earlier expeditions, and visited the islet of Pulau Hujong Duri which is not remote from the Siamese coast of the Peninsula. In 1905 Fox visited Terutau, the month being October (Rep. Botanic Gardens for 1905 p. 9) and in 1906, in August, Mohamed Haniff was there. The last named was there again in 1915 on October 20th at Telok Udang. In November and again in December, 1916, Robinson touched the island at Telok Wau. In 1915 Haniff and Mohamed Nur on November 16th visited Telok Wau, and on November 19th, Telok Udang. All the visits have been short, often of only a few hours when the purpose was the obtaining of plants of horticultural value, such as *Impatiens mirabilis*: and the Botany is therefore very inadequately known.

The Botany of the mainland is altogether unknown.

The map prefixed to this report indicates that from among the Thalamiflorae-Calyciflorae we can attribute 73 species to the square against 205 from Langkawi and 796 for the square containing Penang. The number recorded for Penang suggests that only about one in ten or ten per cent.

of the plants native to the islands has as yet been collected in them. The outer islands have been visited in April only: Terutau has been visited in March, July, October and November: and except Pulau Hujong Duri, only on the southern coast where it can be reached easily by a short crossing from the bays of the north of Langkawi island. Timber working was commenced on Pulau Adang about 1900, but arrested by malaria.

SQUARE *2a*.

This square contains almost its full complement of nearly 1,300 square miles, of land, most of it being Siamese, —part of the Siamese administrative circle of Puket: the rest is in the State of Perlis.

It contains the port of Setul to which Ridley went by sea in 1910, spending the days from March 10th to 16th there (*vide* Jour. Straits Branch Roy. Asiatic Soc., No. 59, p. 47). A year earlier Haniff had been there for living plants. Ridley's locality Bukit Raja Wang is near Setul, and he paid especial attention to such limestone hills in the neighbourhood as Batu Bunga, and Batu Berjongkong. Just previously, Ridley had entered the square from the south at Ginting Kabok on March 1st. In May 1919, Kerr on an enforced halt at Padang Besar collected a few plants.

The extent to which botanising has been done in the square is thus seen to be very small, and the months of the visits March and May, so that of plants vigorous during the rains there is no knowledge. The map shows a record of 53 species; and as the sum total existing must be in excess of what is found in Penang we appear to know only 5 per cent. of the plants of the square.

SQUARE *3a* is in Siam and is quite unknown botanically. Parts of the Siamese Malay States of Sawngkla and Tepa enter into it.

SQUARE *4a*.

This square is wholly Siamese. The land surface in it is of about 1,100 square miles, a little being in the Siamese Malay State of Tepa, within the Administrative Circle of Sritamarat, and the rest being in the States of Nawng-Chik, Tani, Jering, Jalor and Rahman, lying within the Administrative Circle of Pattani.

Gwynne-Vaughan and Annandale, with Skeat, collected at Tani town and Nawng-Chik on the lower Sungei Pattani in April and May, 1899, and then went south into the State of Jalor to Biserat and Jalor town, climbing Bukit Jalor and Bukit Besar (called by the Siamese Kala kiri) which reaches 3,000 feet, Bukit Tapang and the limestone hill of Bukit Gowa. Thence they went into square *4b*.

In February 1916 Annandale revisited some of these places. Gwynne-Vaughan's collections were divided between Kew and Cambridge and his field notes are at Kew.

Kerr in July, 1923 travelled collecting through this square from north to south parallel to the Pattani river, and returned a month later down the river. In September, 1923, he collected on Bukit Besar.

Craib has published part of the results of Kerr's collecting in his *Florae Siamensis Enumeratio*; but the whole is not available yet. The names which it has been possible to collect for the purpose of the map which prefaces this report number 36 only. But with mountains rising to 3,000 feet, the number of species occurring in the square cannot be less than occur in Penang, and is probably more by several hundreds, so that making allowance for the unpublished Disciflorae and Calyciflorae of Kerr's collection, the percentage of Phanerogams collected in *4a* may be estimated at eight. These have been collected in the months of February, April, July and August.

SQUARE *5a*.

This is made up of parts of the Siamese Malay States of Jering, Sai and Rahman,—all within the Administrative Circle of Pattani.

Down collected a few plants in 1900 at the mouth of the Telubin river: and except for these, the botany of the square is wholly unknown.

SQUARE *1b*.

This square is wholly insular, and consists as regards land of the Langkawi islands (Kedah State). There are but five miles of sea between the north coast of Langkawi proper, and the south coast of Terutau in square *1a*. The mountain of Gunong Raya in Langkawi rises to 2,388 feet; and the islands are all very rugged, with limestone and granite formations intermixed. The islands had a considerable population prior to 1821, in which the Siamese laid them waste. Of recent years there has been considerable working of timber. Gunong Raya was visited by Curtis in February, 1890, and was climbed to the summit by Haniff and Mohamed Nur on November 13th, 1921. The list of botanical visits to Langkawi and the neighbouring islands is as follows:—

1888, Curtis in July spent four days at Kuala Malaka and Telaya Tujoh (Seven Wells).

1889, Curtis spent five days botanising on the islets.

1890, in February, Curtis, after collecting on the island of Dayang Bunting visited Langkawi proper and climbed

Gunong Raya and Gunong Chindrang. Dates upon herbarium labels indicate that he returned again in September for a few days.

1892, in April, Curtis spent a few days in the islands. One of the places visited upon this occasion was Pulau Nior Stali which is upon the south-west of Pulau Dayang Bunting.

1897, Ridley and Curtis visited Langkawi together in the month of February.

1899, in February, Curtis after a visit to Terutau in square *1a*, returned to Kuala Kuah for a few days and botanised upon the islets within easy reach.

1900, Haniff spent a fortnight in Langkawi in September much handicapped in collecting by the weather.

1901, Curtis in the month of November spent three days in Langkawi proper. Again he visited Pulau Nior Stali.

1904, Fox in December visited Langkawi.

1905, Fox revisited Langkawi in October, and went forward to Terutau.

1906, Haniff visited Langkawi in August.

1911, Ridley in April collected for two days about Burau, Telaya Tujoh and Pulau Segai.

1914, Haniff in September visited the Langkawi group and collected at Tasek Enak, Telok Siun, Kuala Burau and on Pulau Lidi.

1916, Robinson and Seimund used the opportunity of a zoological expedition for collecting plants in November and December and into January 1917, chiefly on the island of Dayang Bunting.

1921, Haniff and Mohamed Nur from November 14th to 27th collected on Pulau Segai, Pulau Chupak, Pulau Ampak, Pulau Lidi, at Tasek Enak, Telok Siun, Kuala Burau, Telok Datai, Temoyang, Penarak, Bukit Selat Panchur, Tanjong Neru, Telok Apau, Goa Chirita and Ayer Hangat.

1925, Holttum in August collected on Pulau Langkawi and Pulau Dayang Bunting.

The list appears long: yet the total number of Thalamiflorae-Calyciflorae collected, as given on the map, is only 205. Now the Langkawi group cannot carry fewer species than Penang; and probably carries more on account of its varied rock formations. It is therefore estimated that in spite of the long list of visits we know not more than 25 per cent. of the plants which occur. The more effective botanisings have been done in the months of November and December: smaller collections have been made in February,

April, July, August and September. The limestone has perhaps received more attention than the other rock formations.

SQUARE *2b*.

This square comprises the State of Perlis and a part of the State of Kedah, in all about 750 square miles. There is much rice-cultivation in it, a very large part of which is old. In 1821 the Siamese laid waste the land, and much went out of cultivation, to be resumed only after a considerable interval, but to be extended in no small measure during the last peaceful half-century. In 1821 Penang was dependent for its rice upon these Kedah fields, and suffered greatly in consequence of their devastation.

As the eastern margin of the square is east of the Alor Sta-Singgora road, all that has been collected along this road comes from within the square. Ridley having spent the period from February 23rd to 26th, 1910, about Alor Sta and on Bukit Pinang, traversed it on February 27th, proceeding to Perlis: Burkill and Haniff on March 19th, 1924 also collected along it, northward as far as Asun.

Ridley collected from February 27th to March 9th, 1910 round Kangsar, and particularly where limestone occurs in the neighbourhood, *e.g.* at Tebing Tinggi, Bukit Lagi and Bukit Besih Hangat; and he also collected at Bukit Telor Jambu and at Chupeng (*vide* Jour. Straits Branch, Roy. Asiatic Soc., No. 59, p. 27).

In the year 1881 in May Kunstler visited Kedah. It has never been quite clear to what places he went; but from the labels on his specimens it is clear that he reached the country from Penang and it would assuredly be by sea. Now among the specimens which he collected and labelled "Quedah" is a plant, which, strictly confined to limestone, can be got easily on Gunong Geriang near Alor Sta. These two observations leave the supposition that he went to Alor Sta quite probable.

The limestone hill just named was visited by Curtis for one day in 1889, and by Fox in 1904 (Report Botanic Gardens for 1904 where the name is misprinted Grenong), also by Ridley when at Alor Sta in 1910 and by Haniff in November 1914. Alor Sta was visited by Burkill and Haniff from March 16th to 20th, 1924, on which occasion collecting was done about Kuala Kedah, Anak Bukit, Kepala Batas, and Langgar. Haniff, who had collected at Alor Sta in November 1915, was there again in April, 1918 and April, 1924, each time for a few days. In November 1915 he proceeded from Alor Sta northwards to Bukit Wang and Jenum; and in March 1924, he visited Bukit Tunjang.

The result of this work, as far as the Thalamiflorae-Calyciflorae are concerned, is a list of 150 species, and as the square is likely to contain as many as square *2d* (within which is Penang), it may be that 18 per cent. of the plants of it are recorded.

The vegetation of the rains is almost unknown; and except for Haniff's work the hills have not been explored.

SQUARE *3b*.

This square is wholly of land, three quarters of it being in the State of Kedah, and the rest in the Siamese Malay States of Tepa and Jalor.

Except that Burkill and Haniff on March 17th, 1924, made an expedition from Alor Sta into the square nearly as far as Nerang, no collecting has been done in it.

SQUARE *4b*.

This square is wholly of land. A very small part of it is in the State of Kedah: the rest is in the Siamese administrative circle of Pattani being parts of the Siamese Malay States of Jalor, Rahman and Legeh.

In April or May, 1899, Gwynne-Vaughan visited Kota Bahru and Bukit Sembilan near to it, both being in the State of Rahman; and thence they passed into square *5b*. In July, 1923, Kerr traversed the square from north to south parallel to, and west of the Pattani river, and a month later descended the river. Kerr's collections are being worked out by Craib, and will increase the number of Species of Thalamiflorae-Calyciflorae recorded from the square to well above the figure of 27 as given on the map.

The square is full of high mountains and must possess a rich flora. If it is half as rich again as Penang and if the second part of Craib's *Florae Siamensis Enumeratio* doubles the figure on the map, then we know its Phanerogamic vegetation to the extent of upward of 5 per cent.

SQUARE *5b*.

There are about 1,000 square miles of Siamese land in this square, being part of the Siamese Administrative Circle of Pattani, and of the States of Legeh and Sai.

In April or May, 1899, Gwynne-Vaughan visited Tremangan and Belimbing in the State of Legeh and collected a few plants. In July, 1923, Kerr collected for four or five days between Tanjong Mas and the Telubin river; Bukit Railway Station at which he collected is in this square.

On the map 11 plants are assigned to the square, the flora of which is thereby demonstrated as all but unknown.

SQUARE *6b*.

This square contains only about 380 square miles of land, a small part of it being in Siam (Pattani circle), and the rest being in the plains around Kota Bahru in the State of Kelantan.

On August 24th, 1889, Ridley spent a few hours collecting at a place called Kamposa, which has ceased to exist; it was near to the mouth of the Kelantan river (see Jour. Straits Branch Roy. Asiatic Soc., No. 20, p. 87). The neighbourhood was revisited by him in 1917, when he stayed for a week at Kota Bahru. In 1899, Yapp, who had joined the Skeat expedition, collected about Kota Bahru between September 29th and October 10th, and he collected also at Kuala Essam which is close to the southern margin of the Square. Gimlette, during several years of work at Kota Bahru, commencing in 1909, collected plants with an economic interest. Bagan estate, where McGill collected, is on the right bank of the Kelantan river about twelve miles above Kota Bahru.

The species recorded for the square, which on account of cultivation has a flora poor in numbers, are as regards the Thalamiflorae-Calyciflorae 51, or perhaps upwards of five per cent.

SQUARE *2c*.

There are only about 350 square miles of land in this square, consisting of the coast of Kedah from near Kota Sarang Semut to the coast of Province Wellesley near Ayer Tawar, with rice fields behind a large part of it, but with Kedah Peak or Gunong Jerai rising about midway between the north and south limits to 3,978 feet.

As in square *2b*, so in this square the Siamese invasion of Kedah in 1821 sent most of the rice land to waste. It was recovered slowly, and enterprise in irrigation of latter years has extended it.

Thomas Lobb, Veitch's collector (there were two brothers of this surname who collected for that firm of horticulturists) climbed Kedah Peak in 1845 (see Hortus Veitchii, 1906, p. 42), and the dried plants obtained by him were named, made up into sets and sold; but the localities sadly intermixed before they were issued. Lieutenant-Colonel James Low, when in charge of Province Wellesley at some date before 1867 climbed the Peak and sent plants collected there to Kew. Sir Hugh Low, when Resident at Taiping, also climbed the Peak, taking with him Boxall, a collector for his family's firm of Hugh Low and Co. Early in 1876 Murton made an expedition to it. A report which he addressed upon his return to the Gardens Committee, Singapore, is no longer to be found; but in his report on the Government Botanic Gardens for 1876, it is referred

to and called an expedition "to Quedah, Penang and the neighbouring States." He sent the plants which he obtained to Kew; and it is evident that he reached the foot of Kedah Peak.

In 1893 Ridley landed at Yan and ascended the Peak from that village, remaining six days upon the mountain. The month of this journey was June.

In March, 1911, Bell and Haniff climbed the mountain from Gurun upon the landward side; and this line of ascent has now become the usual one.

In 1915 Robinson and Kloss collected 200 specimens in the months of November and December upon the upper part of the mountain. In the same year in November Haniff spent two days on it, again three days in August 1919, and two days in February, 1920. Holttum and Haniff in April, 1925 spent four days on it, collecting chiefly near the summit.

So much for the mountain: next for the plains. At Gurun, whence the road ascends Kedah Peak, Burkill and Haniff collected in transit in March, 1924, and at Kota Sarang Semut. Ridley collected at Yan on the expedition mentioned above, the month being June. When upon their way to Yan, driven by weather to take shelter, he and Curtis spent a day on Pulau Songsong: from Yan Curtis returned to Penang.

Finlayson in 1821 visited the Kuala Muda in January, and in the same month of the year 1918, Burkill collected down the south bank of the Muda river from Pinang Tunggal to Dusun Gajah. Burkill and Haniff visited Sungei Patani town in March, 1924.

The map shows only 142 species of the Thalamiflorae-Calyciflorae, against 796 for the square containing Penang island. Yet Kedah Peak, with a greater height than the highest of the hills in Penang island, should contain a richer flora. It seems possible that we know but 14 per cent. of the Phanerogamic plants of the square: and it is clear that much more attention should be directed to Kedah Peak.

SQUARE *3c.*

This square consists entirely of land: and most of it is in the state of Kedah. Except that the road between Sungei Patani and Alor Sta for a short distance near Bedong runs within the western margin of the square and that Burkill and Haniff collected a few plants there in March, 1924; and but for the collecting by Father Ichebesta near Baling of a few plants economic to the Negritos, nothing whatsoever is known of the Botany of the square.

SQUARE *4c.*

There is a small part of the State of Kedah within this square, a considerable part of the Siamese Malay State of Rahman, and a large part of the northern marches of Perak.

In January, 1922, Flippance col'ected a few plants near Klian Intan which is close to the western margin. Betong is not remote, but within Siam: and there Kerr collected both in August, 1923, and March, 1925. Kerr's August expedition ended on Gunong Ina also called Gunong Titi Basah which is upon the Siam-Perak boundary.

The figure for this square upon the map is only 23: but this needs to be doubled in order to allow for the increment to our knowledge which will come when Craib publishes his further determinations of Kerr's plants. The square is one of mountains, and undoubtedly has a very rich flora. It contains a curiously abrupt and altogether unstudied peak in Gunong Kendrong. It also contains quite a considerable amount of deforested land. Probably our knowledge of its flora does not exceed four per cent.

SQUARE *5c.*

One-third of this square is part of the Siamese Administrative Circle of Pattani being part of the State of Legeh the other two-thirds is part of the State of Perak.

In the years 1892 and 1893 Machado was employed at the Tomo Gold Mines, and around Tomo he collected plants which he sent to the Botanic Gardens, Singapore.

The square is one of mountains and dense forests with so rich a flora that Machado's contribution scarcely gives us knowledge of say two per cent. of the flora.

SQUARE *6c.*

This square is almost entirely of land, and except for a small part of the State of Trengganu is in the State of Kelantan. The Kelantan river is formed just within its southern limit by the junction of the rivers Lebir and Galas. The name Lebir is here applied as upon the official maps.

Between 1903 and 1909 Gimlette was stationed at Kuala Lebir and there he collected economic plants which he sent to the Botanic Garden, Singapore (*e.g. vide* Report on the Gardens for 1904)..

In 1923 Haniff and Mohamed Nur ascended the Kelantan and Lebir rivers. Of their collecting places Riverside was reached on January 20th, and Kuala Krai on the next day. Kuala Krai is almost identical with Kuala Lebir. At Kuala Krai a halt was made of five days and Bukit Temangan was visited. Kuala Krai was revisited on the return journey upon February 14th.

The map shows 94 species for this square and judging thereby we can now record perhaps ten per cent. of the plants occurring in it.

SQUARE *7c.*

This square consists of about 700 square miles of the State of Trengganu. Botanically it is entirely unknown.

SQUARE *8c.*

In this square are about 30 square miles of the State of Trengganu and some islands including the island of Great Redang with Pulau Pinang sheltering under it.

These islands were visited by Yapp between October 14th and 19th, 1899, and the few plants collected in them are preserved at Kew.

SQUARE *2d.*

This square contains the island of Penang, and, with it, the greater part of the Province Wellesley and a part of the Krian district of the State of Perak. Penang island has an area of 107 square miles and about 2,000 Phanerogams have been collected in it. The highest hill-top is 2,722 feet.

The island passed into the control of the Honourable East India Company in 1786, and was then wooded from shore to summits. Light and his company in three ships anchored at the point where Georgetown now is, and began clearing the woods of Calophyllum which was there: and this was followed by a kind of race for possession of the land behind: wherein "those who cleared the most..... were deemed the most meritorious." The progressive spread of this clearing is recorded in Logan's Journal No. 2, p. 174. Rapidly the land was denuded of its good timber back to the foot of the hills, all in the hope of great prosperity from its fertility; and in about 1800 a new town was planned called St. James' upon the Sungei Keluang which was to rival Georgetown or the original settlement. It failed, because the agricultural prosperity did not come at its making, and it had not the support of commerce.

War rendered a look-out on the hill-tops desirable; and therefore a road was made to what is now called Government hill, but then Flagstaff Hill. This road, finished in 1802 or 1803, made possible a considerable amount of destruction in the hill-forests. But it came slowly: indeed not in a great measure till the forests, when, what with charcoal burning and what with desultory pepper-growing, clearing extended to the very summits, provoking a protest which may be read in Logan's Journal, 2, p. 534. When the Straits Forest Department was created in 1883, the deterioration of the

timber-growth had become very marked. Even where extensive fellings did not occur, good timber was removed in such an excessive measure as to change the nature of the forest. Burn-Murdoch in his Annual Forest Administration Report for 1902 called attention to the still necessary need of letting the forests recuperate.

There is reason to believe that many plants common in Penang in 1786 are rare now in consequence of the change in the covering of the land, and that one or two, formerly present, no longer exist upon the island.

Christopher Smith was the first with any botanical knowledge to visit the island. He was employed by the East India Company to raise nutmegs, cloves and other spice trees in the Moluccas and to send them to Penang. When the young trees had arrived in considerable numbers, the Governor asked that Smith be sent to see to their planting and so he came to Penang in the year 1796: and from Penang sent plants of the island to Roxburgh in Calcutta. A collection of drawings which he made is in the British Museum of Natural History.

Roxburgh had another correspondent in Penang who had likewise been in the Moluccas. He is denoted in Roxburgh's Hortus Bengalensis by his initials,—H.C. And he had in 1802, a third,—his own son William, who in the months of May, June, July and August of that year collected dried plants, and sent or took them to Calcutta along with living plants for growth in the Company's garden.

In that year also, a surgeon upon the Madras staff, Sir William Hunter, found himself in Penang; and there he drew up an account of the plants of the island, which after remaining a century in manuscript in the British Museum, was printed in the Journal of the Straits Branch of the Royal Asiatic Society, No. 53, pp. 49–127. He too sent plants to Roxburgh. His often mentioned "Soongey Clooan" is the Sungei Keluang at Rihlau or St. James'.

In the year 1819 another surgeon in the Company's Service, William Jack in the train of Raffles reached Penang. He was there from December 31st, 1818 to May 22nd, 1819. His letters to Wallich in Calcutta, describing his botanisings in Penang, were printed in the Journal of the Straits Branch of the Royal Asiatic Society, No. 73, pp. 151–238, and the plants which he is known to have collected are listed on pp. 241–268. Unfortunately he died young, and his valuable collections were burned in the destruction of the East-Indiaman "Fame."

In the end of 1821 a mission from India reached Penang upon its way to the further East; and as naturalist on this mission was the surgeon George Finlayson. From December 11th to January 5th of the next year Finlayson collected

in Penang: and the plants which he obtained went finally into the large East India herbarium distributed by Wallich between 1828 and 1832. Unfortunately it seems that some of Finlayson's specimens are mis-localised. Raffles edited his diary under the title "The mission to Siam and Hue in the years 1821–22" (London 1826).

Later in the latter year came to Penang Wallich, Roxburgh's successor as Superintendent of the Company's Garden in Culcutta, and with him was George Porter, head-overseer of the Garden, both seeking health. Wallich collected in Penang in the months of August and November, —in the first on the way to Singapore; in the second as he returned to Calcutta; but Porter elected to remain in the island, and was given a post of schoolmaster, together with, in 1823, the charge of a small experimental garden at Ayer Etam, not that once under Christopher Smith, but a plot nearby. Porter continued to collect for Wallich.

Wallich's and Porter's plants were distributed like Finlayson's between 1828 and 1832 by Wallich from London.

Over these years W. E. Phillips was Lieutenant-Governor of Penang. He put up and befriended Finlayson: he helped Wallich and doubtless brought about Porter's appointment. He collected plants himself, remitting them to Wallich and, it is said, later to Kew. In the year 1824 he presented a collection to the newly founded Horticultural Society of London, which perhaps represents his own herbarium: and these are now at Kew.

In 1830 Colonel George Warren Walker was stationed in Penang; and he collected plants. Between 1829 and 1832 Lady Dalhousie, wife of the 9th Earl, collected ferns in Penang for Sir William Hooker. In 1837 Gaudichaud upon his second voyage round the world touched at Penang. The voyage was conducted with great rapidity and Gaudichaud's opportunities for collecting were few: but one may be sure that he used them to the full. In 1845 on his way to Malacca Griffith spent in Penang the first few days of that year fatal to him and collected. He had two friends and correspondents in Penang who sent plants to him. One was Sir William Norris, the Recorder, the other the Assistant Resident Councillor, T. Lewis. The first named also sent plants to Kew.

In 1845 Thomas Lobb, who has been mentioned as having climbed Kedah Peak, collected in Penang. The remark already made in regard to the untrustworthiness of his localities unfortunately applies to his Penang plants, as to the others.

In 1857 the traveller Sir Robert Schomburgk was appointed British consul in Bangkok and on his voyage

thither he touched at and collected in Penang, sending his collections to Kew.

Between 1863 and 1868 Maingay, then Magistrate in charge of the Jail in Malacca found occasion to visit Penang and collected a little.

In 1873 Wawra spent a day or two in the month of February collecting in Penang. His collections are enumerated in his *Itinera principum S. Coburgi* (Vienna, 1883–1888).

In 1869 Stoliczka collected a few plants in the island.

In 1879 Sir George King upon his way between Calcutta and Java collected in Penang. This was in the months of August and November. After his return to Calcutta he engaged as a collector Kunstler; and we find that the latter was in Penang in April, 1881 and August and September, 1883. Hullett of the Education service in Singapore found an occasion of collecting in Penang.

In 1881 Major McNair, Colonial Engineer of the Straits Settlements, then acting Lieutenant-Governor of Penang, collected and sent to Cantley in Singapore specimens of the important timber trees of the island (Cantley's Report on the Forests of the Straits Settlements, appendix E, 1883).

The need of the forests brought about the continuous botanising of Penang under the administration of Cantley, Superintendent of the Botanic Gardens, Singapore. It was obviously impossible for Cantley from Singapore to supervise forest operations closely in Penang, and therefore as local forest officer Curtis was appointed with a considerable amount of independence from his superior. He reached Penang in July, 1884; and at once commenced to collect information upon the constitution of his forests, building up in Penang his own herbarium, while Cantley was building another in Singapore. He corresponded independently with Kew and with Calcutta, and produced in 1894 his "*Catalogue of the Flowering plants and Ferns growing wild in the island of Penang.*" But he also subsequently entered as regards the determination of herbarium material into close relations with Ridley.

Curtis used his subordinates for watching for the flowering of forest trees; and often his labels carry the information that a forest guard had brought the specimen in. J. Abrams was one of his subordinates.

The Penang herbarium for very sound administrative reasons was amalgamated with the Singapore herbarium in 1910.

Curtis left Penang in the year 1902; and was succeeded by Fox until 1910. Upon the Gardens staff under both and after both was Mohamed Haniff. Fox and Haniff have added

not a little to our knowledge of the island. Haniff's Mount Erskine is not the Mount Erskine of the maps, but Mount Olivia where Erskine once lived. In December, 1900, and forward to March, 1901, a traveller E. Deschamps visited Penang, and made a small collection of plants which was presented to the Royal Botanic Gardens, Calcutta. Visits of inspection took Ridley at intervals to Penang during the whole of his service; and more or less regular quarterly visits took Burkill from 1913 to 1924. They collected there and so also did Mohamed Nur of the staff of their department. Matthew in 1913 collected ferns in Penang. In addition several Forest Rangers have collected of resent years for the reference herbarium of the Conservator of Forests.

This completes the enumeration of botanists of Penang. The following paragraphs concern Province Wellesley.

It was in 1800 that Province Wellesley came under the administration of Penang, having at the time the scanty population of twenty souls per square mile, and therefore clad in forests. In the next year a Siamese invasion of Kedah gave it settlers, who, driven from their homes, cleared much of the northern part. This northern part differs from the southern in possessing many lines of sandy parallel sea-beaches which afforded excellent village sites; whereas the sea has had to be kept out by embankments from the lowlands of the southern parts. The north thus became setttled by Malays, and rendered to Penang what Penang had hoped for before its acquisition, namely grazing lands and ricelands. Clearing therefore advanced in the northern half, back from the sea-front as far as the conditions extended of alternating old sea-beach and hollows, that is, of permatang and sawah. But the south of the Province passed into the hands of men with means enough to do the large drainage works demanded,—men who made sugar estates. Forest by these operations was pushed out of the square with which we are dealing; and when in 1883 Reserves were created in Province Wellesley, they were of necessity so far eastward as to be in square *3d*. At that time an experimental plantation was made at Kubang Ulu (since 1923 in the charge of the Agricultural Department). The care of this plantation and of the forest reserves in square *3d* frequently took Curtis and Ridley into the Province and inspection of coconut estates not infrequently took Burkill thither for a day at a time. In 1881 in April Kunstler paid a visit. Under these circumstances a fair amount of information has been gathered on the Higher plants. In the year 1894 Bishop Hose collected Pteridophyta which are now preserved at Kew.

The hill of Bukit Mertajam rises to 1,700 feet, and is within the square. It is interesting that it carries at least

one plant absent from Penang island. It was botanised on by Ridley in and by Burkill and Haniff on October 8th, 1922. But the area of forest left upon its top is small, and has been much cut over.

The small part of the district of Krian to the south of Province Wellesley, which lies within the limits of this square, has never been collected in.

The map which prefaces this report shows a record of 796 plants of the Thalamiflorae-Calyciflorae for the square; and experience teaches that very few are likely to be added. The square is therefore used as a standard to indicate how many species may be expected in an area of this latitude of about 600 square miles and rising to a little above 2,000 feet.

SQUARE *3d.*

The half of this square is in the State of Perak, the rest in the State of Kedah and consisting of the eastern border of Province Wellesley towards Kedah. Within this eastern border is the Forest Reserve of Tasek Gelugor, now in the process of passing over to agricultural land, and there was the reserve at Ara Kudah, which was given over to agriculture in 1902. Visits to these two reserves took Cantley and Curtis into the square in November, 1885, and Curtis on many subsequent occasions, as well as Ridley and Burkill.

Expeditions just a little wider and so extending into the State of Kedah were made by Burkill to Lunas in December, 1913, Haniff to Kulim in June, 1917, Burkill and Haniff to near Padang Sarai in September, 1921; and further in 1910 Haniff visited Gunong Bongsu.

Northern Perak has received more attention. It happened that political events in 1879 caused the early opening up of the Selama district, and this opening up enabled the botanists encouraged by Sir Hugh Low to collect in it. One of these was Scortechini who has left a number of specimens labelled Ijok, and who, it seems also reached Gunong Inas, a mountain which rises to 5,898 feet. His locality quoted as Abu Selama appears to be rightly Ulu Selama.

Gunong Inas was reached by Wray in 1892 and by Yapp in 1899. Wray's visit was in the month of May, Yapp's in December. Both travelled by the Selama river. Yapp was at Selama village from November 27th to 29th, and on the upper part of the mountain from December 6th to 24th. In returning he collected at Sira Rimau on December 26th and to January 4th; and he also collected at a locality called "coffee plantation" which is between Sira Rimau and Selama. Northwards of Gunong Inas is Gunong Bintang

which exceeds 6,000 feet. It was visited by Kunstler in June, 1880, and by Kloss in June, 1917.

In the lowlands upon the southern limit of the square is the Pondok Tanjong Forest Reserve. Forest officers as Burn-Murdoch and Barnard have collected in it, and it was visited by Haniff and Burkill on March 25th, 1924. West of this is the developed agricultural area round Bagan Serai, botanically unknown except for a few plants collected by Burkill and Haniff in March, 1924.

The eastern slopes of the Bintang-Inas range come into the square, but are unknown except where in the extreme south-eastern corner of the square the Kuala Kangsar-Grik road passes through Durian Pipit and Kota Tampan and Lenggong. Ridley traversed this road in July 1909 and Burkill and Haniff in June 1924. At Lenggong are limestone cliffs whereupon Ahmed bin Hassan, Ridley's collector, obtained interesting plants (Journal of the Straits Branch of the Royal Asiatic Society, No. 57, p. 5).

The number of plants of the Thalamiflorae-Calyciflorae collected in the square, as the map shows, is 149, which seems to indicate that 12 per cent. of the flora is known. No part of the square is well known: and a full study of the mountains would have results of great interest.

SQUARE *4d.*

Upper Perak makes the greater part of this square, in fact, except for an unknown bit of Pahang, the whole.

Wray was in Upper Perak in August 1885 when he visited the Kenering river, and in May of the year 1889. He was in Upper Perak again in 1905, collecting upon the Kenering River in the month of April. In he was on the Piah River.

In the year 1909 Robinson and Kloss made a zoological expedition to Temengor which is right in the centre of the square: and Ridley accompanied them. He reached Grik on July 4th and proceeded to Temengor by elephant, collected upon the Sungei Kertai and pushed up the Temengor river for a day's journey. After collecting diligently there but under considerable difficulties from the unhealthiness of the country he returned by river to Kuala Kendrong (not Kuala Kenering as is by inadvertence printed in the account of the expedition) and so to Grik again on July 29th. (Journ. Straits Branch, Roy. Asiatic Soc., No. 57, p. 5).

In 1924 Burkill and Haniff were at Grik from July 16th to 21st, collecting there, and also in coming and going at the following places along the road to Kuala Kangsar: Kenering, Lawin and Sungei Kulim.

It is important to observe that all the collecting in Upper Perak has been done over the months from April to July; and useful to recollect that over at least a part of this period there is a lull in the flowering of the vegetation which makes collecting relatively unremunerative. The count of the Thalamiflorae-Calyciflorae known from the square gives 179, which assuming that square *3d.* and *4d.* are equally rich gives 15 as the percentage that is known.

The climate and perhaps also past conditions encourage bamboos, which are rather conspicuously present in the wide forests.

SQUARE *5d.*

This square is astride the Main Range and is half in the State of Perak and half in the State of Kelantan. No part of it is botanically known except the interesting mountain of Gunong Stong in Kelantan upon its eastern limit. Gunong Stong is of granite with a very abrupt cap of metamorphosed limestone.

Jupp climbed it in the month of 191 , and sent a few plants from the summit to Singapore. Mohamed Nur when accompanying Foxworthy from Kuala Lipis in Pahang to Kelantan in 1924, climbed it on March 5th to 7th. The small figure for the square given on the map shows that for every part of the square, not excluding Gunong Stong, there is an unworked field.

SQUARE *6d.*

Except for the eastern edge which is in Trengganu, this square is in the State of Kelantan. It is made up of two valley-systems, that of the Galas river and that of the Lebir river, which will be considered in this order.

Galas valley.—Down collected a few plants upon a prospecting expedition up the Galas river. In 1924, between February 22nd and March 1st, Mohamed Nur, attached to that expedition of Foxworthy which is mentioned above, collected at a series of places down the course of the river, *e.g.*, Kuala Sameh, Sungei Renong and Kuala Limau Nipis.

Lebir valley.—In 1899 when Skeat was making his attempt to ascend Gunong Tahan from the north (Journ. Federated Malay States Museums, 3, p. 77) Yapp accompanied him as far as Kuala Aring (where the Aring river enters the Lebir river), and remained at this place from August 16th to September, 26th, collecting. In 1917 for half the month of February, Ridley resided upon the Channing Estate, which is upon the last reaches of the Lebir river before its junction with the Galas. His locality Jeram Panjang is on the Lebir just above the estate. In 1923, Haniff and Mohamed Nur entered this square from the north on January 26th and collected up the river

successively at the following places: Kuala Endong, Temiang, Kuala Rek, Telok Lalu, Bukit Papan, Kampong Kobang, Kuala Relai, and Kampong Parit. They passed out of the square southwards on January 31st; but descended the river again ten days later.

The number of species of the Thalamiflorae-Calyciflorae recorded on the map is only 39, and except for the small collection of Yapp, all were got in January and February. The vegetation must be quite as rich in species as that of the last two squares and assuming the similarity, 39 may be considered as indicating a knowledge of two per cent.

SQUARE *7d.*

This square is in the State of Trengganu and botanically unknown.

SQUARE *8d.*

This square consists of rather over 400 square miles of the State of Trengganu. In it is Trengganu town. Thither Ridley was taken on August 22nd, 1889, and contrived to get one day's collecting on the Island of Pulau Ketam and near the town. (Journ. Straits Branch, Roy. Asiatic Soc., No. 20, p. 86). Yapp from October 11th to 13th, 1899 and from October 20th to November 4th was in Trengganu and collected near the town and at Kuala Ibar to the south of it. Holttum visited Trengganu town in May 1925, visiting the island of Pulau Kapas and ascending the river to Kuala Berang. The neighbourhood contains vastly deteriorated forests and shows a great deal of the interference of man. Of its flora our stock of knowledge is but very little; perhaps two per cent.

SQUARE *2e.*

There are but 60 square miles of land in this square, being a small area of the State of Perak between Kuala Kurau and Kuala Gula. It consists of mangrove forest with rice land behind it; and without any doubt the number of species which can be found is a very small one. But as yet no plant is recorded, except generically.

SQUARE *3e.*

There are nearly 1,200 square miles of land in this square, entirely in the State of Perak. The town of Taiping is almost central, and has been the place from which botanical exploration has been done.

As early as 1875 the Botanic Gardens, Singapore were in touch with officers interested in promoting agriculture from Taiping; and when in 1877 Sir Hugh Low was transferred from Borneo to serve as Resident at Taiping his interest in plants caused him to take every opportunity for furthering botanic exploration. In 1877 Murton was sent

to him that he might report upon the extensive damage that had been done in the State by Malays and more particularly by Dyaks exploiting its resources in gutta-percha. Reaching Taiping in October, he climbed the hills on the east of the town, and collected plants, mostly living, which were dispatched for cultivation to Singapore; then he crossed the Gapis pass and went to Kuala Kangsar, whence he proceeded on to the slopes of Gunong Bubu, climbing to the summit. He returned to Singapore in December, reporting on his tour in an account which was printed in the Government Gazette for February 22nd, 1878.

In this same year, the coffee-leaf disease extended so greatly its hold upon the plantations in Ceylon as to cause something approaching a panic, during which certain planters of enterprise removed to Perak in the hope of carrying on where the disease, which in Ceylon they could not avoid, had not spread. These men opened new land near the Gapis pass, where already the Government had established experimental plantations, in the Trong district, and in parts of Perak in square *4f*. One of the earliest of these men was Sir Graeme H. D. Elphinstone, who collected plants a little near the Gapis pass in 1884 or the following years. In 1881 Sir Hugh Low himself collected specimens of forest trees, and sent them to Cantley who happened at the time to be at Kew. In 1882 Sir George King's collector Kunstler, who had a free hand so long as he did good work, established his centre at Taiping; and up to February 1886 he spent the major part of each year collecting from Taiping material to which he attached notes of considerable value. When Kunstler sent plants from Gopeng in square *4f*, Larut labels were used for them, and this seems to have led to a few erroneous records for Larut. In the same year (1882) Scortechini proceeded to Taiping on a visit, which culminated only with his death in 1886. Scortechini neglected the labelling of his specimens and it is difficult to ascertain whither he travelled from Taiping. In March, 1883, Kunstler ascended Gunong Bubu to the summit. In 1884, in May, Scortechini did the same, accompanying Tenison-Woods, whose mission was geologic. There is an account of this ascent in the Journal of the Straits Branch of the Royal Asiatic Society, No. 14, p. 1, from which it is evident that it was made from the north-east side via Gunong Arang Para where the house known as the Hermitage was situated. On his labels Scortechini calls this hill Gunong Haram or Gunong Haram Para. Other labels upon Scortechini's plants show that, confining ourselves to localities within square *3e*, he botanised about Batu Kurau, on Caulfield's hill, Ulu Kangsar and Kuala Kangsar.

From 1881 to 1908 Wray was stationed in or near Taiping, first as Superintendent of the Hill-gardens and then

as Curator of the Perak State Museum and as Director of Museums, Federated Malay States. He accumulated a considerable herbarium during this period, referring for naming his specimens to Sir George King in Calcutta. Naturally the greater part of what he gathered came from this square, and we find on his labels the names of places such as Tupai, Batu Tugoh, Kota or Kampong Kota, Simpang, Blanda Mabok, Matang, Trong, Changkat Jering, Bukit Gantang, Matang Jambu which are all relatively near to Taiping. Wray ascended Gunong Bubu in March, 1890.

It was in 1885 that Curtis found the first occasion for a visit into this square; then in company with Cantley in the month of January, he ascended Gunong Bubu, Gunong Pondok and the Taiping hills. What happened to the collection made is not clear, except that the living plants went into cultivation at Penang. Curtis visited Taiping again in September, 1889, in May, 1890, in October, 1892, in July, 1893, in June, 1897, in October, 1900, and in December, 1901 —short visits all; but all used for the collecting of specimens. The visit of October 1900 is described in an appendix to the Annual Report on the Botanic Gardens for that year. In 1887 he visited Hermitage Hill, and then the Waterloo Estate and Kuala Kangsar, and returning cut a way from the Waterloo Estate to the top of the Taiping hills in three days (appendix to Forest Report for 1887, p. 9).

Ridley paid his first visit to Taiping in March, 1891. He was there again in February and March, 1892, and visited Kuala Kangsar. He was there afterwards in June, 1893, in December, 1902, February 1904, and August 1909. Collecting was done on these occasions upon the hills over the town.

A forest department was formed in Perak in 1897, and A. B. Stevens appointed in charge of it. He was succeeded in 1908 by Barnard. These collected forest trees in various places: and in more recent years other forest officers as Burn-Murdoch, Foxworthy, V. O'Hara, and Borges have done the same. Naturally the attention of forest officers is directed towards particular forests and in square *3e* has been largely towards the coastal mangroves, to which the following names are given: Singa islands, Sungei Limau, Trong and Telok Kertang.

In of before 1889 Hervey collected a little in the neighbourhood of Taiping. In 1898 Robertson-Glasgow visited and collected on the Gapis pass. In 1899 in October Fox collected at Taiping. In the years 1899, 1900 and 1902 Derry who was stationed at Kuala Kangsar collected a little. In 1901 or 1902 Venning collected a little at Taiping.

In 1904 Bishop Hose and Miss Hose collected plants, chiefly grasses, about Taiping town. In 1905 Mrs. Bland stayed for a short time at Taiping and collected. Sir Walter

Napier did the same in 190 . In 1909 Kloss collected upon the hills during a visit paid in May, and in the same year Long, who was stationed there collected and sent to Kew a bundle of specimens. In 1911 James W. Anderson paid a visit to the Taiping hills and collected. In 1913 Matthew collected ferns at and near Taiping. Burkill found an opportunity of a few days collecting in July, 1913 at Kuala Kangsar, when plants were got as well at Lubok Merbau and with Haniff for a fortnight in February on the Taiping hills, and a few days on two separate occasions in June at Kuala Kangsar, when plants were got as well at Lubok Merbau and on the limestone cliffs of Gunong Pondok.

Haniff had been on the Taiping hills on several previous occasions: first he was there with Mohamed Nur in the month of February, 1917 for eight days. In May, 1917 he was at Taiping and at that Ayer Kuning which is near Taiping. In October, 1923 he ascended the Taiping hills. In May, 1924 he was at Taiping and at Batu Kurau, and he was at Kuala Kangsar both in September, 1924 and January, 1925. Kota Lama and Lubok Kerbau are localities which were visited upon these two occasions.

Henderson was stationed in Taiping from December, 1921 to March, 1923 and collected chiefly at low levels.

Burkill collected at Batu Hampar on the edge of the Dindings on March 3rd, 1914.

The neighbourhood of Taiping has been deemed sufficiently worked for a list to be prepared of its plants (Gardens Bulletin 3, p. 303). If the reader will turn to the map he will observe that 957 species of the Thalamiflorae-Calyciflorae are recorded for the square; most of these are from the hills over Taiping. This number is greater by 161 than the number for the square *2d*, a circumstance which must be ascribed not to more thorough working, but to the greater elevation of the Taiping hills and to the greater variety of vegetation thus produced; for it is indubitable that Taiping is not so well worked as Penang: but thanks to Kunstler's long stay it has been worked in every season. An estimate of the percentage of the total number of Phanerogams now known to exist in the square must at present partake considerably of a guess, but is probably somewhere between 60 and 70. There are differences indicated between the east and west faces of the Taiping hills which require working out.

SQUARE *4e*.

This square is astride the Main Range of the Peninsula, extending into the three states of Perak and Kelantan and Pahang. It is hilly throughout; but the higher hills have been little studied. The following statement commences

with collections made in the lower ground, and from the north proceeds southwards.

The Plus river which is upon the northern limit of the square was visited by Wray in November, 1905, and he states that he collected to the headwaters. Burn-Murdoch * collected a few plants in the Plus and Chior reserves in 1912; his Sungei Njing is in the first and his Gunong Berekeh is in the second. Salak was visited by Haniff and Mohamed Nur in December, 1920, and so also Sungei Siput for three days; and Burkill visited Sungei Siput for one day in September, 1920. Near to this place is the Kamuning estate which was visited by Curtis in July or August, 1898, and by Ridley in February, 1894; and where Machado lived for a short while, collecting a small number of specimens.

Ipoh was visited by Curtis in the last days of the year 1895, and in July, 1898, when he collected about the town and southwards towards to Menglembu. Ridley, taking leave in October, 1898, collected about Ipoh and to the summit of Gunong Keledang and at Telok Pinang. He was again at Ipoh in January, 1921. Burkill spent eleven days at Ipoh in August, 1916, July and November, 1917, and September, 1920, collecting upon all sides of the town and largely upon the limestone cliffs of Tambun and of Gunong Rapat and upon those close to Ipoh town; he also collected towards Lahat. Burkill and Haniff spent another five days at Ipoh in June, 1924, when collecting was done largely upon the limestone cliffs of Ampang.

Goldham, an educational officer, collected a few living plants about Ipoh which were examined by Ridley.

Sungei Raya is upon the southern limit of the square. At it Kunstler collected in October, 1880; and from it Burkill and Haniff in June, 1924, procured by the agency of a bomoh a small collection of medicinal plants.

In the square is Gunong Korbu, the second highest peak in the Malay Peninsula. It reaches 7,160 feet. It was ascended by Barnard and Haniff by way of the Korbu river and Gunong Yong Blar and Gunong Bal in the month of May, 1909; but the facilities for collecting were poor, the forest at the time also particularly flowerless. In 1914 Robinson stationed a party of Dyak collectors upon the mountain at 5,000 feet, who from the end of February to the end of March collected between 3,000 feet and the summit. (Journal of the Federated Malay States Museums, 6, p. 43).

The map shows for this square 195 plants of the Thalamiflorae-Calyciflorae. But the square cannot be less rich in species than square *3e*; and if the estimate for *3e* is right, then our knowledge of *4e* is but 13 to 15 per cent.

* We have seen in herbaria these specimens mis-labelled " Selangor."

It is evident thus how little the expeditions to Gunong Korbu achieved in proportion to the work left for others—and Gunong Korbu is only one mountain of the many high ones in the square. Ridley collecting upon the lower hill of Gunong Keledang revealed several species of considerable interest.

SQUARE *5e.*

This square is partly in the State of Kelantan and partly in the State of Pahang. Foxworthy's journey in February, 1924, from Kuala Lipis into Kelantan took him through the square; and Mohamed Nur who was attached to the expedition collected successively at Mesa, Bukit Jelatah, Goa Kechapi, Sungei Yu, Sungei Kaloh and Sungei Merapoh which are between the railway station of Chega Perah and the Kelantan boundary: then after that at Pulai, Kuala Kerteh, Batu Papan, Batu Bau, and Goa Panjang. No other collecting has been done in the square; and it must be stated of it that it is botanically almost unknown.

SQUARE *6e.*

This square has in it, rather towards its southern limit, the mountain of Gunong Tahan, than which there is no higher in the Malay Peninsula. It reaches 7,186 feet. The boundary between the states of Kelantan and Pahang runs over it. Attempts have been made to climb it from the north, but no collecting was done on them. The credit of finding a way to the top, from the southern side, belongs to Robinson, who has had a part in all three collecting expeditions made to it.

In the year 1905 Wray and Robinson set out for Gunong Tahan in the month of May, and together reached the mid slopes, when Wray, by reason of illness was forced to return. Robinson continued and spent June and July collecting on the upper slopes (Journal of the Linnean Society of London, Botany, 38, p. 301). In 1911 Robinson and Kloss went together to the mountain and Ridley accompanied them. Reaching 3,000 feet on July 6th, collecting was commenced by Ridley and done in a remarkably complete way. The return was made in August (Journal of the Federated Malay States Museums, 6, p. 127). In 1922 Robinson, who had established a semi-permanent camp upon the mountain undertook to direct two of the staff of the Botanic Gardens Department upon it; and Haniff and Mohamed Nur proceeded thither. They collected for twelve days in June, demonstrating how very thoroughly Ridley had collected before them.

All these ascents of Gunong Tahan were made by the Teku river: and along it collecting has naturally been done.

Upon the north of Gunong Tahan in February, 1923, Haniff and Mohamed Nur collected along the course of the Lebir river at Kuala Pertang, Kelumpur, Kuala Bedong, Kuala Manis, Lala Terlong, and Bator Kelantan, on the 18th of February, 1924, Mohamed Nur collected at Goa Ninneh, which he reached from Pulai upon the upper course of the Galas river.

The map shows that only 126 species of the Thalamiflorae-Calyciflorae are known from the square. It is a small number, and possibly only five per cent. of the whole flora. It is disappointing that we know nothing of the plants of Gunong Tahan which do not flower in the months of June and July: in fact we know really very little of the flora of the mountain.

SQUARE *7e.*

This square is distributed between the three States of Trengganu, Kelantan and Pahang. Botanically it is quite unknown.

SQUARE *8e.*

There are about 1,200 square miles of land in this square, all in the State of Trengganu, and quite unknown botanically.

SQUARE *3f.*

This square contains the west coast of the Peninsula from just north of the Bruas river to just beyond the Perak river. It is therefore partly in the Dindings, and mainly in the State of Perak. The land surface is about 900 square miles. The forests of the Dindings are but little disturbed and contain fine timber, while inland is the large Bruas or Blanja forest reserve.

The Dutch had a fort on Pangkor island for receiving tin, of which we are told that in 1688 it possessed not a yard of cultivation, but that the forest pressed upon it. (Dampier's Voyages, 2, 1699, p. 174). Then and afterwards ships would touch at the coast in its neighbourhood for refreshing—for water or for new masts and spars, etc.: and from his ship touching there on January 9th, 1822, for some simple need, Finlayson was able to collect a few plants. But after Finlayson no one botanised in the Dindings until the forest wealth was protected, except that Scortechini paid a short visit in July 1884.

On January 19th 1888 Curtis seems first to have commenced his charge: then he spent six days at Pangkor, about Lumut, Rajah Itam and elsewhere (S.S. Government Gazette in March, 1888). He was on Pangkor island, at Telok Sera, on the Bruas river, up to Pengkalan Bahru, at Tanjong Burong, on Gunong Tunggal, at Tanjong Hantu, Simpit, Sungei Puyu, etc.,* between July 7th and 14th of

* Tanjong Gol is on certain records said to be in Perak: that is a mistake. It is the western end of Singapore Island.

the same year (Appendix to Forest Report for 1888). He was at Lumut again in November, 1889, and so on. Ridley and Curtis were together in the Dindings in February, 1892, and thence forward annually until 1900. In July of that year Hill and Curtis were together through the Dindings. After this date occurred Burn-Murdoch's visits to the Dindings and to the Bruas reserve. Burkill was at Lumut and at Pengkalan Bahru in the commencement of March, 1914.

Off the coast are the Sembilan Islands: they are all small. Ridley and Curtis visited them together in 1892; E. S. Hose visited them in 1918 and Kloss visited the largest of them, Pulau Rembia by name, in May, 1916. Seimund collected on Pulau Rembia in November, 1918, and on Pulau Lallang in November and December, 1925.

Telok Anson town is upon the very margin of the square. Kunstler collected a little at it when proceeding into the interior. Scortechini visited Telok Anson in August, 1886, and probably at other times. When stationed there, E. S. Hose collected in the countryside. In 1924 Haniff spent a week there in the end of September. The following localities near Telok Anson are upon their labels and within the square:—Kota Stia, Pulau Tiga and Pasir Panjang Ulu.

Largely as a result of collecting in the Dindings, the number of Thalamiflorae-Calyciflorae known from the square is, as recorded on the map, 288. The rest of the square has furnished little. It is not a mountainous square, and perhaps we can name 30 per cent. of the species occurring in it.

SQUARE *4f.* *

This square contains the Kinta valley and the greater part of the Main Range to the east of it. The valley has suffered extensive degradation of its covering, both on account of clearing and on account of flooding by streams surcharged by silt. The change is not by any means all of the last half century, for Daly who surveyed it in 1874 has left it on record how relatively easy his work was on account of the removal of so much of the forest canopy. However, there are some extensive reserved forests within the square; and the mountains are densely forested.

Batu Gajah is close to the northern limit of the square, and from its neighbourhood Burkill and Haniff collected in the end of June, 1924. East of Batu Gajah and equally

---

* The locality "Limbo Hills" occurs in the Materials for a Flora of the Malay Peninsula. For it read limestone hills.

near to the northern margin of the square is the mining centre of Gopeng which place is connected by road southwards with Kuala Depang, Kampar and through Chanderiang with Tapah. These places received early attention when the country was opened up. In the year 1880, in the month of September, Kunstler went to Gopeng and remained there or near by at Kota Bahru and Kampar until the end of the year. The first European plantations were then being made on Gunong Bujong Malaka and about Kuala Depang.

In 1881, in November, Kunstler paid another visit to Gopeng, and he paid a third in 1883, spending then the months of June to August there. His locality Gunong Mesah is a hill a few miles to the south of Gopeng.

In April, 1885, Scortechini appears to have visited Gopeng. In July he returned to it again from Taiping and ascended the neighbouring parts of the Main Range. After that he was prostrated by fever, and took the voyage to Calcutta in a vain effort to shake it off. Discovering in Calcutta how extensive were Kunstler's collections, he agreed to pool his efforts at writing a flora with Sir George King's; but he died in the next year.

In August of the same year Kunstler worked in the Batang Padang district, and upon lower slopes of Gunong Batu Puteh.

Curtis made an extended journey in 1894, when having landed at Telok Anson on August 16th, he proceeded to Tapah, and thence (1) to Kalindi, four miles northward (2) to Kuala Depang, eighteen miles, and (3) collected on Gunong Bujong Malaka which is above it and (4) at Sungei Siput which is a mining village to the east, and (5) on Gunong Mesah. He returned to Telok Anson collecting upon the way in Kampar and Tapah (Gardens Report for 1894, Appendix). In the next year during the last ten days of the year he was back again at Kuala Depang, Gunong Bujong Malaka and Kampar (Gardens Report for 1895, Appendix B) : and in 1898 he collected in August for a third time upon Gunong Bujong Malaka (Gardens Report for 1898, Appendix B). This hill was visited by Ridley in October, 1898. In April, 1925, Henderson visited the limestone hill Gunong Lanoh, near Gopeng.

In 1890 Wray organised a very extensive exploration upon the mountains east of Tapah. He set out from Telok Anson on June 6th for Tapah by road, and from Tapah went by river to Kuala Wok: from this spot he climbed Gunong Batu Puteh, and was back in Tapah on July 19th, whence he went to Chanderiang; but he returned to Tapah and spent August and half of September upon Gunong Batu Puteh. On October 5th he set out for Gunong Chunam Prah and Gunong Beremban from which he descended on the Pahang side of the Main Range into the watershed of a tributary

of the Jelei river; then he crossed Cameron's Plateau in a north-westerly direction reaching Gopeng on the 24th of the month, and from Gopeng his base at Tapah. This long expedition is described in the Journal of the Straits Branch of the Royal Asiatic Society, 21, p. 123. For the time being it seemed to exhaust interest in the region.

In 1908 Robinson and Kloss made a zoological expedition to the Plateau and Ridley accompanied them to botanise. November found Ridley at Tapah, where he collected for a fortnight, then he ascended to the Plateau and remained there for three weeks. He collected very largely upon a river called in the reports the Telom, but this instead of being the Telom of the official maps is the Sungei Bertam which only after a considerable course runs into the Telom. He collected also upon a Gunong Beremban which is not the "Gunong Brumber" (or G. Beremban) of Wray's expedition, though near it. The fact is that exact geography is an importation into these regions. The expedition is reported on in the Journal of the Federated Malay States Museums, 4, p. 1. Upon a second expedition into the Plateau, Robinson made notes upon the vegetation seen upon Gunong Terbakar (Journal of the Federated Malay States Museums, 10, p. 248). In June, 1923 Robinson paid a third visit and was accompanied by Henderson, and the latter returned thither in January, 1924, and again in November and December 1925.

Tapah was visited by Burkill and Haniff from June 27th to July 2nd, 1924, when collecting was done towards Jor, at Tapah Road and Temoh and Haniff returned to Jor between September 12th and 19th. After this he went to Telok Anson, where he was until September 30th, collecting within the square at such places as Bandar Telok Anson, Durian Sabatang, Sungei Tukang Sidin and Degong. Henderson spent a week at Jor, in May, 1923.

As a result of all this work, the number of Thalamiflorae-Calyciflorae recorded for the square upon the map is 608. The height of the mountains assures a far richer flora than Penang has, perhaps even a flora twice as numerous in species; and on this assumption it can be calculated that we know 35 to 40 per cent. of what occur. It is remarkable that all the collecting has been done in the second half of the year and in further work attention should be directed to the region in the first half.

SQUARE *5f*.

This square is wholly in the State of Pahang. It consists of a mountainous and densely forested tract. The nomenclature of its rivers is peculiar; for the longest, the Telom, surrenders its name upon uniting with a much lesser stream, the Jelai, which in turn surrenders the name of Jelai in square *6f*, to become the Pahang river.

Machado collected upon the Jelai in May, 1903. He had made an earlier expedition prospecting towards its head waters in 1900; but whether he collected then or was unable to do so is uncertain, and it is uncertain also if all the specimens labelled "Jelei" were gathered within this square or in *6f*. He described the upper part of the stream in the Journal of the Straits Branch of the Royal Asiatic Society, 33, p. 263. His Sungei Cha-ang seems to be the Sungei Chelang of the official maps and his Sungei Betak the Sungei Betan.

In the south-western corner of the square is Benta, where Burkill and Haniff collected a little in November, 1924.

Botanically the square is almost unknown as the small number—6—recorded from it upon the map indicates.

SQUARE *6f*.

This square is wholly in the State of Pahang. As the route by which Gunong Tahan has been reached is in it, and as Kuala Lipis is in it, rather more collecting has been done, than in the squares which border it.

In 1923 Machado collected a little about Kuala Lipis. In 1924 Burkill and Haniff spent a week in November there collecting about the station, at the much older centre of Penjom, at Chineras and Ulu Chineras and at Budu. The Benchah forest reserve is across the Lipis river from Penjom and has supplied specimens of forest trees to forest officers. And upon the same side of that river is the Sungei Cheka which has done the same.

A little further eastward the Tembeling river joins with the Jelei to make the Pahang river, and Kuala Tembeling has served as the base whence botanists have started for Gunong Tahan. The large and difficult expedition of Ridley, Davison and Kelsall towards Gunong Tahan, in 1891, collected about it. This expedition reached Kuala Tembeling on July, 12th, Pulau Manis upon the Tembeling river on the next day, Kuala Tahan on the day after; it was at Sungei Tenok from July 21st to August 8th (*vide* Appendix to Gardens Report for 1891, and the Transactions of the Linnean Society of London 3, p. 269). Collecting was done at a spot recorded as Khol. It did not pass northwards out of the square, but was driven back by difficulties along the Tahan river. Of the localities which appear upon the labels of specimens, it is believed that Pulau Kinchi is upon the Tembeling river, but none of the following can be placed:—Guai, Blay Manis, Pulau Tijau, Pulau Padang, Pulau Datoh, Lubok Pelang, and Sungei Paut.

In 1893, Becher, who soon after lost his life in a flood of the Tahan river, collected a little about Kuala Tembeling.

The expeditions of Wray and Robinson and of Robinson, Kloss and Ridley to Gunong Tahan refrained from collecting plants on the Tembeling that the porterage of specimens collected further up might not be interfered with. The expedition of Haniff and Mohamed Nur to Gunong Tahan in June, 1922, collected a little on the return journey at this place. Their locality Kuala Manis appears to be the same as Ridley's Pulau Manis.

In November, 1924, Burkill and Haniff procured a small collection from Kuala Tembeling.

The number of the Thalamiflorae-Calyciflorae recorded from the square is 235. Assuming the square richer in species than Penang island, and nearly as rich as square *4f*, it can be estimated from the figure 235, that we are able to record about 15 to 18 per cent.

SQUARE *7f* is partly in the State of Pahang and partly in the State of Trengganu; and it is botanically terra incognita.

SQUARE *8f*.

There are rather more than 1,050 square miles of land in this square, most of it in the State of Trengganu; but a very little in the State of Pahang.

On August 25th, 1889, Ridley was taken by His Excellency the Governor of the Straits Settlements to the mouth of the Cherating river, and had a few hours for collecting. In 1890 Vaughan Stevens in an attempt to study the Sakai tribes upon the Kemaman river collected specimens of plants economic to them. In 1904 Rostados sent to Singapore a collection from the mining centre of Bundi, which is on the upper Kemaman.

By means of these small collections the number of Thalamiflorae-Calyciflorae known from the square is found to be 42, which cannot be more than four per cent. of the number existing.

SQUARE *2g* contains the islet of Pulau Jarak, visited on December 20th, 1904 by Robinson, and in November, 1919, and described in the Journal of the Federated Malay States Museums, 10, p. 259.

SQUARE *3g*.

In this square are the lowlands from near the mouth of the Perak river to a point about midway between the mouths of the Bernam and Selangor rivers. The area of land is under 500 square miles, and the flora doubtless restricted. Low caused the river Bernam to be explored in 1879 and in 1885 Sir Frank Swettenham commenced his journey from sea to sea along it. In 1886 Kunstler was on it; but it is uncertain if he collected upon the lower reaches,

i.e. in the square. In 1924 Haniff collected from Telok Anson, at Rungkup, Utan Melintang, Bagan Datoh and Telok Bahru.

The number of Thalamiflorae-Calyciflorae thus made known is 22; and the percentage of the flora of the square which has been collected may be set down at about two.

SQUARE *4g*.

This square consists very largely of low-lying land, and a little sea. The area of the land is about 1,160 square miles, roughly half in the State of Perak and half in the State of Selangor. There are important reserved forests in it, as Changkat Jong, Bikum, Trolak and Bukit Belata; and from them a little collecting has been done. Joining the Sungei Bidor near Changkat Jong is the Sungei Sungkai. In May, 1882 Kunstler was upon the Sungkai river; and in November, 1885 Curtis also; but the chief object of the latter appears to have been living plants, and the herbarium specimens resulting are few.

Considerably further south and nearer the Bernam river is the small hill of Changkat Mentri, which was visited by Kloss in September, 1918.

The figure on the map for the square is 51, and we are unable apparently to record a greater percentage of the flora then three.

SQUARE *5g*.

This square consists of a section of the Main Range, extending into the three States of Perak, Pahang and Selangor. It has been the subject of considerable attention very largely because the Semangko pass rendered the higher parts of the hills accessible. Within Perak is the Behrang forest where forest officers have collected; and south of it is Tanjong Malim where Burkill and Haniff collected a little in July, 1924. It is suspected that the plants which Kunstler labelled "near the Bernam river" came from somewhere in the direction of Tanjong Malim.

In the Selangor part of the square is Kerling, near to which Goodenough collected in 1899 and north to Kuala Kubu whence the road over the Semangko pass climbs to the head of the Selangor river. In the year 1886 Kunstler removed himself from Taiping and collected until September in this square. His chief collecting place was Ulu Bubong, and the specimens which he got there are dated with the months of January, July, August and September. In July, August and September he visited the heads of other streams, namely the Bera and Kal. The latter is written Kol upon the official maps; and in March and April he had visited further the head of one of the two Kerling streams, presumedly the larger which has its source almost under Fraser

Hill; and he visited also the head of the Selangor river itself. These specimens when they reached Calcutta were labelled Perak; but the valleys themselves are in the State of Selangor. His base, if on the Bernam river, would be on the present State-boundary. During the period when he was working these Selangor valleys he also went north into Perak, and collected in the Slim valley, plants which may have been got in this square or in square *5f*. He has a locality "P.P." which has not been identified, but may be assigned from his dates to this square.

The path over the Semangko pass which gave place to the modern road was long called the "Pahang track" and this name appears on upon the labels of plants; for instance, Ridley in July, 1897 collected upon the Pahang track, and Curtis in 1902 and Machado in May, 1903. In February, 1904 Burn-Murdoch collected a few forest trees at the pass, and in August of the same year Ridley made a stay more extended than upon his previous journey, being joined by Hosseus. At this date there were mines known as the Simpang mines at the place upon the ridge now known as Fraser Hill or Bukit Fraser; and Ridley collected much about them. He was there again in April, 1911. In 1912 Burn-Murdoch again collected a little at the pass. In 1921 Cubitt did the same, reaching northwards to "Pine-tree hill." In October, 1921 Mrs. Ferguson-Davie collected at Fraser hill. In 1922 Burkill and Holttum spent half the month of September collecting there (Gardens' Bulletin, 3, p. 19). In 1923 between August 25th and September 18th Holttum, Henderson, Foxworthy and Mohamed Nur collected there.

Somewhat nearer to Kuala Kubu than the Semangko pass is Bukit Kutu, where Ridley collected in May and June, 1896.

The Semangko pass gives access to the Raub district of the State of Pahang. Around Raub Burkill and Haniff collected in November, 1924 from the 8th to the 15th, and they procured by the agency of *bomohs* economic plants from Batu Talam to the northward. The following localities near Raub appear upon their labels:—gorge of the Sungei Tras, the Simpam river, the Liang river (both visited where the Batu Talam road crosses them), Gali and Dong. Many of the Dong plants came from the Jahit-Rambei forest reserve.

To the east of Raub is the large Bilut forest reserve, where forest officers have collected a little.

On the Main Range below the middle of the square is Gunong Ulu Kali whence Burn-Murdoch procured plants.

At the southern limit of the square is Bentong. Foxworthy and Burkill visited this town on December 6th,

1922. Best visited it from June 12th to 17th, 1924 and Burkill and Haniff from November 12th to 17th, 1924. The following localities near Bentong are within the square:—Sungei Perting, Gunong Raja, Bukit Raka, as also any place stated to be on the north or west of Bentong town. The flora of the conglomerate hills near Bentong is certainly interesting; but Best's visit at an unfavourable season to Bukit Raka is the only attempt so far made at a study of it.

The figure for the square appearing on the map is 489; and it is estimated that this represents 30 to 35 per cent. The hill collections have almost all been made in the first nine months of the year; the collections from the low country to the eastward have been made in June and November.

SQUARE *6g*.

This square is the square of the mountain of Benom. It is entirely in the State of Pahang. In 1900 it was required that a trigonometrical survey beacon should be placed upon the summit of Benom and Barnes, taking a plant collector with him, made the attempt to get it there. He started from Ulu Gali; but did not reach the summit by some three miles. From a subsidiary summit where he placed the beacon, and which he supposed to be Gunong Kluang Terbang, he brought back a collection of 122 specimens. In March, 1923, Evans reached the summit and collected, and in July and August, 1925, a Chinese collector of the Federated Malay States Museums made a collection near the summit.

Within the northern margin of the square runs the Benta-Jerantut road, along which on November 23rd, 1924, Burkill and Haniff collected a little, at the localities Tanjong Musa and Batu Bâlai. Then they collected also at Jerantut upon the two subsequent days and on December 12th. In March, 1923, Foxworthy and Henderson collected in the Temerloh district north of the Semantan river.

From north to south the Pahang river runs through this square; and it has been collected on at various places. Ridley collected considerably between July 7th and 9th, 1891, in the Pulau Tawar neighbourhood, at Pulau Tawar, Pulau Changei, and Tanjong Antan, which indeed are not remote from the new Jerantut ferry. Ridley's locality Kadondong is on Pulau Tawar. To the east of the river at a few miles from it are the limestone rocks of Kota Glanggi where Ridley collected in 1891, and Kota Tongkat where Evans collected in June, 1917. Evans also collected at Kuala Tekam near by.

Further down the river is Kuala Krau, and opposite are more limestone rocks, those of Gunong Sennyum at which Evans collected in June and July, 1917.

The Thalamiflorae-Calyciflorae known from the square are 130, or 8 to 10 per cent. of the probable total.

SQUARE *7g*.

This square which is wholly in the State of Pahang is covered by vast forests, traversed by the Jerantut-Kuantan road. Burkill and Haniff collected a very few plants along this road on December 7th, 1924 at Ulu Tekam and Sungei Lepar. Its southern margin is touched by the Pahang river whereon at Kuala Luit Ridley collected in 1891.

The figure on the map for the Thalamiflorae-Calyciflorae is 25, and our knowledge may be two per cent.

SQUARE *8g*.

There are about 1,000 square miles of the State of Pahang within this square, the interior being botanically unknown, but some collecting having been done on the coast from Kuantan northwards, where it is bold and hilly.

There are extensive forest reserves in this area where forest officers have collected, *e.g.* Burn-Murdoch and more lately others. Between June 17th and 23rd, 1913, Burn-Murdoch collected at Bukit Gapis, Bukit Galing, Tanjong Api, Bukit Ubi and Tanjong Tembeling. Durnford sent orchids to Ridley from Kuantan in 1889. Burn-Murdoch has collected in the Baloh reserve. Burkill and Haniff were at Kuantan from December 3rd to 7th, 1924, collecting there, at Telok Sisik, Ayer Puteh, Beserah and Kuantan ferry.

At the very south of the square is the mouth of the Pahang river; and collecting done upon its north bank was done within the square. On August 19th to 21st, 1889 Ridley was at Kuala Pahang with His Excellency the then Governor of the Straits Settlements; Darat Selah is a locality of this visit. In 1890 he spent a fortnight in the month of May at Pekan, crossing over the river on occasions to the north bank where he visited Pramau, Jambu, Kuala Brawas and Tanjong Medang; and he visited Kuala Mahang, Tanjong Gajah Mati and Pulau Manis, which are a little inland. In 1891 he started for Gunong Tahan from Pekan, visiting Pulau Manis and Pulau Rumput. In July, 1917, Evans collected a little at the mouth of the river.

The number of the Thalamiflorae-Calyciflorae recorded for the square on the map is 208; and it seems likely that this represents about twenty per cent.

SQUARE *4h*.

There are within this square about 600 square miles of the State of Selangor, all low-lying and much of it cultivated. In the centre are vast swamps covered with timber, in which the Bukit Cheraka forest is reserved. To the north is the Rantau Panjang forest where Ridley and Burn-Murdoch collected in August, 1904. On its edge is Batang Berjuntai, another name which appears upon their

labels. Kloss collected a little at Rantau Panjang on July 28th, 1914. Ridley collected at Kuala Selangor and southwards to Klang in the month of June, 1896.

Port Swettenham is upon the southern margin: to it Burkill and Mohamed Nur have paid collecting visits in every month of the year except January. In some of these visits collecting was extended to Klang. There is a record of Bishop Hose collecting also at Port Swettenham in the month of .

The flora is doubtless poor. The number of species of the Thalamiflorae-Calyciflorae collected in the square is only 58; and judged thereby we know not more than 12 per cent. of the plants occurring.

SQUARE *5h.*

Kuala Lumpur is within this square, which extends from the State of Selangor across the Main Range into the State of Pahang. To Kuala Lumpur Ridley was sent in 1889 and there he collected plants. His Bukit Kuda of this trip is a spot where horses were changed on the way from Kuala Lumpur to Klang, and with horse transport the name has now gone. In 1890 he endeavoured to arrange that a native collector should be stationed there. To start the collector Curtis went thither, and collected a little; then he left the collector, who proved unsatisfactory and only worked through the month of May. Garawang is one of his collecting places.

In 1891 Kelsall went to Bukit Etam at the head of the Langat valley and brought back collections (Journal of the Straits Branch, Royal Asiatic Society, 33, p. 67).

In 1896 Ridley while inspecting forests between May 9th and June 11th, collected considerably about Rawang, Dusun Tua, Bukit Etam, Ginting Peras, Ginting Bidai, thus reaching the watershed (Selangor Journal of September 4th, 1896). Goodenough, a subordinate in the forest service, was transferred to Selangor in this year and continued during several years of work to collect, doing so at various places, such as Batu Caves, Rawang, Kuang and Kanching. In 1897, Ridley was again at Kuala Lumpur in the month of July and collected about Batu Caves; in 1899 he sent a plant collector thither and was himself there for a few days. He collected there again in August, 1898.

In the year 1905 Engler visited Kuala Lumpur. Such plants as he collected are without doubt conserved in the Botanic Gardens at Dahlem near Berlin.

In 1910 Burn-Murdoch procured specimens from Gunong Ulu Kali, and in 1912, using forest rangers, chiefly Hashim, he collected around Kuala Lumpur and sent the specimens to Kew.

In 1911, Robinson commenced to organise collecting on the Main Range above Kuala Lumpur with the object of working out the dispersal of Himalayo-Sondaic animals southwards along the hills; and with the same end in view he caused plants to be collected. He sent Dyak collectors first to the head of the Langat valley to Gunong Menuang Gasing or Bukit Nyor or Nerang in the end of May and they collected through June (Journ. of the F.M.S. Museums, 4, p. 235). In 1912 Kloss visited Ulu Langat, and went to Gunong Mengkuang Gasing (Journ. Linn. Soc. London, 41, p. 285). The plants collected were sent to Kew (Journ. of the F.M.S. Museums, 5, p. 28). Later the Dyaks were sent to Gunong Mengkuang Lebar which is not far from Gunong Ulu Kali where they collected through the months of January and February, 1913. Kloss in 1914 collected about Rawang. In March, 1915, Ridley, revisiting Kuala Lumpur was taken by Robinson in connection with these investigation to Ulu Gombak on the way to Ginting Sempah and to the quartzite ridge of Klang Gates. Upon a further visit in September, 1917, Ridley visited Ginting Sempah; and soon after Kloss collected upon the not remote pass of Ginting Bidai and again in Ulu Langat. In 1921 Ridley paid yet another visit to Kuala Lumpur, and collected again with Kloss and Milsum at Klang Gates in the month of January. The name Sungei Tua forest reserve indicates a corner of the extensive Gombak forest reserve. The Forest Department has collected in it. During 1921 Hume collected for the Federated Malay States Museums in the vicinity of Kuala Lumpur.

There is a small forest reserve in Kuala Lumpur itself, Weld's Hill, which has served many officers in the Forest Department as a place for studying plants. Its name occurs often upon labels. The Forest Department has also collected considerably around Kuala Lumpur, particularly since Foxworthy joined it in 1918. Sungei Buloh Forest Reserve and Kanching Forest Reserve in particular have supplied specimens.

The Sungei Buloh Forest Reserve is continuous with the Bukit Cheraka Forest Reserve towards Klang where Burkill has collected on odd days in March, June and October, 1922, in January and December, 1923, and in September, 1924. Burkill also collected near Kuala Lumpur upon different occasions, *e.g.* at Batu Caves in November, 1916, and in October, 1922, and elsewhere in February, 1919, and September, 1920. Foxworthy was at the Ginting Sempah in December, 1922, at Klang Gates and in the Sungei Buloh forest in December, 1923: and Mohamed Nur was in the Sungei Buloh forest in the same month, 1923. Burkill and Haniff collected a few plants about Serdang in November, 1924.

Matthew collected ferns near Kuala Lumpur in 1913. Sanderson collected Myxomycetes there, and Brooks fungi.

The road descending from the Ginting Sempah to Bentong is within the square all except its last few miles. Burkill and Haniff collected along it near the Benus river, in November, 1924; and also upon the first few miles of the Bentong-Kuala Pilah road.

A bit of the Negri Sembilan is in the square, but no one has ever botanised in it.

The map indicates that 576 plants of the Thalamiflorae-Calyciflorae have been collected in the square; and this figure suggests that we could authentically record rather over 50 per cent. of what occur.

SQUARE *6h.*

This square is chiefly in Pahang; what is not is in the Negri Sembilan. The Bentong-Kuala Pilah road crosses the square and has been collected on by Best on July 14th, 1924. In November, 1924, Burkill and Haniff procured collections of economic plants from Karak and Pelangai (Manchis).

The Pahang river flows upon the east side of the square and near it are the townships of Semantan and Temerloh. Ridley, Davison and Kelsall passing along the river in 1891 collected near Temerloh or Kuala Semantan, Telok Malati, and at Jellam (?Jeram) Panjang to the south of it.

In 1913, Burn-Murdoch with the aid of a collector from the Botanic Gardens, Singapore, collected from Semantan and Temerloh down the river.

Under the direction of Kinsey forest trees have been collected in the reserves of the north-eastern part of the Negri Sembilan, such as Triang and Pasoh.

The figure that the square bears upon the map is 153. The collecting has been rather desultory and bearing in mind the certain richness of the flora, 153 indicates that not more than 15 per cent., and possibly only 12 per cent. of the plants occurring can be named.

SQUARE *7h.*

This square is entirely in the State of Pahang; it has the Pahang river along its northern border, the marshes of the Bera river, and the forested hills from Gunong Chini southwards in the centre and south. Along the banks of the Pahang river where village succeeds village, taxonomic botanists have not been drawn to do any extensive collecting, and in reality they are little known. Ridley collected here and there along them in July, 1891, as at Kuala Bera (Kuala Brok on his labels), and Fox in 1893 travelled up

the river collecting at Gunong Chini in this square. In 1913 Burn-Murdoch travelled in the opposite direction collecting between June 9th and 14th, on Gunong Chini, at Kuala Bera, Lubok Paku and Bintang (Gardens Bulletin, 1, p. 310). In November, 1924, Burkill and Haniff reached the river at Lubok Paku, collected a little and left there for a few days a collector named Ngadiman.

Elsewhere the botany of the square is unknown.

The figure on the map is 43, and this suggests that our knowledge of the square amounts to less than three per cent.

SQUARE *8h.*

There are rather less than 1,100 square miles in this square, all belonging to the State of Pahang. The Pahang river is upon the northern margin; swamp forest and forest on low hills covers the rest.

Kuala Lepar, where Burkill and Haniff collected a few plants in December, 1924, is on the river in the square. Pekan is in the square. As recorded under square *8g*, Ridley visited Pekan for a few days in 1889, and for half a month in May, 1890, collecting considerably; but his localities are rarely to be found on the official maps and therefore an enumeration here will be useful. He visited Renchong, Kalambalai, Ayer Hitam, Pigang, Katapang, Bohie, Telok Malati, Pengkalan Kazai, Sungei Parit.

Haviland was at Pekan for a few days in 1890.

In 1891 Ridley, Davison and Kelsall started upon their journey to Gunong Tahan from Pekan, but did not collect much on the lower reaches then. In 1913 Burn-Murdoch collected a few plants there, and in 1917 Evans a few. In 1924 Burkill and Haniff spent the last week of November at Pekan in much rain, collecting as far as flooding permitted south and west of the town.

The number upon the map of Thalamiflorae-Calyciflorae is 145. The evenness of the surface of the land scarcely promises a large flora and it is possible that we know now eighteen or twenty per cent. of what occur.

SQUARE *3j* contains the Aroa Islands which were visited by Robinson in August and September, 1906, (Journal of the Federated Malay States Museums, 2, p. 8, and 6, p. 253).

SQUARE *4j.*''

This square contains but 200 square miles of low-lying land in the State of Selangor, from Port Swettenham township southwards to Batu beyond Morib. The Telok Forest Reserve is within it, and was visited by Burkill on September 22nd, 1918, May 4th, 1919, March 6th and 13th, June 12th,

September 18th and 28th and December 7th, 1921. Collecting was done also between it and Port Swettenham on June 19th, 1913, March 25th, 1915, and August 13th, 1916.

The number of Thalamiflorae-Calyciflorae recorded for the square upon the map is 15 only; from which it is surmised that we can enumerate and authenticate the names of about six per cent. of the Phanerogams.

SQUARE *5j*.

There are about 1,000 square miles of land in this square, partly in the State of Selangor, and partly in the Negri Sembilan. Very little collecting has been done in the Selangor part. Burkill and Haniff collected a few plants in November, 1924, at Kajang, and the Forest Department has collected a little in the Kalambau Forest Reserve. In the Bangi Forest Reserve, and about Bangi, which is in the Negri Sembilan, the Forest Department has collected also.

Of the little States of the Negri Sembilan, Sungei Ujong became accessible before any of the others, and in 1874 had a British officer at Seremban. In 1875 a rough survey of it was made; but it was not for another eleven years that any attempt was made to investigate its vegetation. The investigation was done under Cantley's orders, for he sent his collector Alvins to Seremban in 1885. Alvins passed through Rantau either in coming or in going, perhaps in both. Bukit Lasing at which he collected is a few miles to the south of Rantau. His localities Temiang and Kapayang are places close to Seremban. His Bukit Sutu has not been precisely identified, but there is only little doubt in regard to its identity with a hill over Setul. He passed northwards beyond Setul to Beranang which is upon the Selangor border. At this time a bridle path existed via Setul to Beranang, and a cart road was in course of construction from Seremban to the coffee plantations upon the Beremban hills. It may be assumed that Alvins collected upon both. He collected at Pantai which is a little to the north of Seremban and on Gunong Beremban which is in square *6j*. On some occasion he visited Cape Rachado; but probably from Malacca by sea. Finlayson touched in 1821 at Cape Rachado.

Burkill and Haniff collected at Mantin on November 30th, 1924.

In square *5j* are many forest reserves at which forest officers have collected, chiefly the Senawang reserve, near Seremban, and the Sendayan reserve, a little farther away.

In 1922 Holttum collected about Seremban and in the Senawang Reserve.

The Bukit Tunggul Forest Reserve is in Selangor, but upon the boundary of the Negri Sembilan. In it forest

officers have collected, and in 1896 Ridley visited the neighbouring country between Kajang and Sepang, chiefly the Reko woods. In 1898 he visited Seremban in December, and collected there and at Perhantian Tinggi. At the same places Burkill and Haniff collected at the beginning of November, 1924. In 1920 Ridley visited Bukit Tangga from Seremban in the month of December; and on account of the number of new species brought thence Mohamed Nur was sent to the same place at the commencement of December, 1923.

Williams collected orchids near Siliau about 1915 to 1918 and Ridley in 1891 collected along the railway from Port Dickson to Kuala Sawar on the Linggi river through Sirusa and Siliau. Milsum also has collected at Port Dickson.

In the Singapore Herbarium are a few specimens collected near Port Dickson by William P. Handover, a planter of that neighbourhood.

Sungei Ujong offers an instance of an interesting change in population centres. It is apparently the case that Beranang was once far more important than it is now, but no one has as yet tried to indicate to what extent the Malays repressed the forest before Europeans were able to enter the country.

The square as the map shows is known to possess 119 species of Thalamiflorae-Calyciflorae. The square containing Malacca is known to possess 794, yet it is much more level than square *5j*, and certainly poorer in species. It cannot be therefore that *5j* is better known than ten per cent.

SQUARE *6j*.

This square is wholly in the Negri Sembilan, with the town of Kuala Pilah almost at its centre. Its lower ground is considerably given over to agriculture; but it has wide forests over mountains reaching over 3,000 ft. The Rembau ricefields are old, and while that country under the hills shows very markedly that the woodlands between the fields are in an artificial condition; so too do the lower slopes of the mountains themselves, the forests having been greatly changed by removing timber. The Main Range of the Peninsula ends at the south margin of the square in Gunong Tampin.

Gunong Tampin may have been climbed by Alvins, who certainly worked for quite a long time close to its foot. He also reached Ayer Kuning in 1884 from the Malacca side and no doubt it was easily accessible as mines were being worked at the time at Geminchih. In 1893 and 1894, Goodenough collected for Ridley on Gunong Tampin. In 1913 in the month of September, Robinson sent his Dyak

collectors to collect upon it (Journal Federated Malay States Museums, 5, p. 51) and visited it himself. In August, 1915, July and August, 1916, July and November, 1917, January and October, 1918, Burkill collected upon the slopes of it and to Kendong; and on May 1st, 1918, Foxworthy and Burkill botanised to the summit. Holttum likewise botanised to the summit in November, 1922. Ridley got nearly to the summit in 1917.

During the last week of November, 1922, Holttum collected in the Tebong Forest Reserve, at Selaru, Senaling, Kuala Pilah, Bukit Linggung and Ulu Bendol, whence he climbed Gunong Angsi. At exactly the same period of the year following Mohamed Nur, attached to a zoological party under Chasen, collected on this mountain over a fortnight. His locality Ulu Rembau is the headwaters of the Rembau stream upon Gunong Angsi. Fourteen years earlier, that was in 1908, Winkler collected on Gunong Angsi, collections of which presumably the first set is preserved at Breslau.

Moorhouse, Kinsey and other forest officers have collected in the forest reserves of Senaling Inas, Kepis, Bahau, Serting, and at the Bemban which is northward of the river Triang at Juasseh, in the Ulu Petasih which is near the Triang reserve, and about Durian Tawar.

In 1917 Ridley visited Johol and collected for a few days upon the river there called Sungei Jelei.

The result of this collecting is that 286 Thalamiflorae-Calyciflorae are recorded; which figure, taking Malacca as a standard, indicates that less than thirty per cent. of the flora of the square can be named.

SQUARE *7j.*

This square is made up of parts of the States of Pahang, Johore and the Negri Sembilan. Botanically it is very little known. Genuang in Johore was visited by Ridley in March, 1915. Gemas upon the borders of the Negri Sembilan and Johore was visited by Burkill on November 2nd, 1918, February 27th and August 9th, 1919, and September 16th, 1920. The figure for the square on the map is 20 only.

SQUARE *8j.*

The watershed of the Rompin river in Pahang makes a large part of this square; south of it a part of the State of Johore is included. In 1891, in the month of August, Lake made a hasty visit to the Endau river and climbed Gunong Janeng which is just within the square. It was not the first visit paid by a scientist to the mountain, as Mikluho Maclay had been there in 1875: but it led immediately to another; for returning with Kelsall in October, 1892, Lake proceeded to survey towards the south while

Kelsall went up Gunong Janeng and made botanical collections (Journal of the Straits Branch of the Royal Asiatic Society, 26, p. 3).

Evans in July, 1917, collected on the lower Rompin river as at Leban Chondong.

In 1922 the Forest Department carried out an extensive reconnaissance of the Rompin forests and collections of some extent were made.

The figure upon the map for the square is 101, and an estimate of the extent of our knowledge of the Phanerogamic flora works out at about 10 per cent.

SQUARE *9j*.

The area of land in the square is small, being but little more than 200 square miles. It is parts of the States of Pahang and Johore near the mouth of the Endau river, and islands off the mouth.

Feilding visited the Endau river in October, 1892, with Lake and Kelsall. Evans visited it in August, 1917, collecting at Kampong Pianggu. Foxworthy in May, 1918, visited Penyabong.

The figure upon the map is only 28.

SQUARE *0j*.

The beautiful island of Tiuman is in the square, its mountains covering its whole surface and rising to 3,383 ft. There is little room for cultivation and a small population; so that its forests have not suffered disturbance. The Dutch boats proceeding to China and Japan used to touch at it for water or spars which they could draw unmolested; and in that way Kaempfer came to land upon it in 1690. He estimated its population as 1,000 (History of Japan, 1728, p. 61). It has been said that later when pirates used Pulau Aor extensively, they depopulated Pulau Tiuman; but this is to be doubted seeing how Pulau Tiuman is devoid of level land for agriculture.

In 1889 Ridley touched at Nipa Bay upon the west coast on August 18th. Nanson went thither for orchids which he cultivated. In 1915 Robinson went thither upon a zoological expedition and Burkill accompanied him. The interval from June 21st to 29th was spent at Joara Bay upon the east coast and the mountains ascended to 1,100 ft. Sungei Tawar and Sungei Bagu empty themselves into this bay. A visit was paid also to Tanjong Duatah on the south coast. In June, 1916, Kloss made another small collection from Pulau Tiuman which he sent to Kew.

As the Thalamiflorae-Calyciflorae number 62 and as the island must be richer in species than Penang, we appear to know less than eight per cent. of its flora.

SQUARE *5k.*

This square contains only 60 square miles of land, being the area round Kuala Linggi, and northwards to beyond Cape Rachado (Tanjong Tuan). The Menyala Forest Reserve and the Pasir Panjang Forest Reserve are in it; in them and at Tanjong Agas Forest Officers have collected a very little. Alvins visited Cape Rachado.

SQUARE *6k.*

Almost the whole of the Territory of Malacca is in this square: with it is a narrow margin of that part of the Negri Sembilan which lies just north of Malacca. Upon the east side a narrow strip of the Territory of Malacca is in square *7k.*

The writer is inclined towards Dr. Winstedt's opinion in regard to the age of Malacca town. Dr. Winstedt has it that "Malacca existed as early as the 13th century A.D., and became a commercial centre about 1400 A.D. owing to immigration of Malays from Singapore or Tumasak—the sea country" (Journal of the Straits Branch of the Royal Asiatic Society, 1922, No. 86, p. 257). There is no reason for thinking that Malacca differed materially from the typical Malay state, which was founded by the ability of a party to extract revenue from the trade of a waterway: but in its case the waterway was an unusually large one, being the Straits of Malacca itself. For such a success men and resources were necessary; and it is clear that the immigrant element which brought the centre forward was, even if a fugitive element, one unbroken, and probably one quite friendly to the pre-existing element on which it grafted itself.

Taxation of the trade between India and Java furnished one part of the resources, but certainly not the whole, for commodities changed hands in Malacca, a merchant-population existing under the military population, and exploitation of the country behind was done. It would be gratifying to ascertain how great was the effect of this exploitation upon the vegetation: but the indications left to us are very meagre. The conclusions seem warranted that the ability of Malacca to levy duties indicates a largish population to be fed, which must have pressed upon the forest, and that the presence of the mart argues a certain amount of good government and security such as would aid it. But we have information in the Chinese work Ying-yai Sheng-lan of 1416 that rice being little grown was imported to feed the place: it was aided by some sago locally extracted: and in a list of vegetables, etc., which could be had in the town are named gourds, melons, mustard, and pepper, which may reasonably be considered imports like the rice: further, cattle, buffaloes, ducks,

fowls and goats were found only in small numbers. It may be taken as certain that Malacca did not feed itself from the land immediately behind it: instead from behind it, jungle produce as lignum aloes, dammar and ebony were drawn, and two tin mines were worked. The coconut-trunk, says this Chinese account, was split to make the floors of the houses: sugar-cane, plantains and the jak-fruit were to be had. These one regards as garden produce. Boat-building was an industry, the dammar used for caulking the seams; and much food was taken from the sea by fishermen who used dug-outs. Mats were made, doubtless by the women, and marketed: the Chinese account suggests that Nipa was used rather than Pandanus; and the Nipa would be got wild.

Thus we are brought to a conclusion that if the rice supply was certain, no more than gardens would be needed to add to it and the fish, upon which the town fed itself: but gardens on a fairly liberal scale.

Siam, after a long period of unchecked expansion southwards, at this time appears to have been able to extract tribute from Malacca, and Malacca to have thought it possible to assert itself against the demand. Then to avenge an affront, the Chinese Emperor Yong-lo sent a successful expedition against Siam and after it ordered Siam to keep its hands off Malacca, with which he entered into commercial relations a little closer; and Chinese merchants seem to have resided in Malacca, meeting there those who brought western calico, etc., from India.

A Chinese work, the Hsing-cha Sheng-lan of 1436, states that Pahang had much rice: and an account of Malacca in 1537 in another, the Hai-yu, states that Malacca got rice from three places, one being Siam, and another P'o-to-li, which is given elsewhere as in Pahang. As these Chinese works used older Chinese works for information without indicating what the older works were, the date at which the Chinese ascertained that Malacca was getting rice from Siam and Pahang is left uncertain: but it is a date apparently considerably prior to 1537, at which time the Portuguese were in Malacca, and to a date at which the Malays ruled in it. They, of course, were certainly in touch with Pahang, and that across country; so that the rice may have come overland: and if it did, the hold of Malacca upon its hinterland was stronger than outwardly appears. More cannot be said. The Malacca waters became unsafe for Chinese vessels next, and they ceased to venture up the Straits.

When the Portuguese, in 1511, had taken possession of Malacca they threw into the place three hundred of their countrymen, for whom they found native wives and

giving them lands and slaves, bade them raise a population favourable to Portugal. These lands, they tell us, extended from Cape Rachado to the Rio Formosa, that is Batu Pahat. It looks as if they were lands that had been settled by the Malays of the Malacca State—possibly lands considerably interrupted and spaced out by forest, but garden-lands contributing to the feeding of the town. The ousted Malays gave the Portuguese little peace; and as the colonists were liable to military service, they spent their lives under arms, living in the shadow of the fort in atap huts, instead of bringing into cultivation or maintaining under cultivation (whichever it might have been) the fiefs made over to them.

The Portuguese held Malacca for 130 years: and during that time they threw more and more men into the fort, so that Valentyn credited to it 11,000 to 12,000 souls. It is very significant that upon the Dutch victory of 1641, all that population, except 1,600, chose emigration to Negapatam, a hardship which they would not have consented to had they enjoyed prosperous possession of homesteads under cultivation. Thus was the Portuguese attempt at agriculture a failure; and it is quite likely that their occupation of Malacca undid a certain amount of clearing achieved by the Malays.

Afraid of the fort, but finding plenty of room at a fairly safe distance behind it, during the early days of the Dutch rule, colonies of Sumatran agriculturists moved up the Linggi river. These were the men who adhered to female succession of land, and the laws of Menengkabau; and who formed themselves into the States of Naning, Rembau, etc., expanding over a Sakai population. They spread ultimately towards Malacca as far as Rembia, where later they met the spread of agriculture with a male succession extending from Malacca. It is necessary to recognise in them a second centre of attack upon the virgin forests of the square: they passed eastwards over low undulations, using dry rice cultivation there, into the upper part of the Kesang valley, which was not country uninfluenced by Malacca, for mining, with the market for the metal in Malacca, kept a light touch on it.

About Malacca itself, the Dutch would have no rice grown: they had determined upon the artificial fostering of its production in Java, and forbad the raising of it at Malacca. This left no crops for the Malacca lands but garden crops: and the wastes could certainly not have been removed under the embargo. Dampier in 1688 wrote that rice was imported to feed the town, and the "country was all covered with wood like one forest." Valentyn wrote about 1720 that "except fish and some fruit.....everything has to be brought from other places" into Malacca fort.

However when subsequently the power of Achin and Johore waned, an experiment was tried with the lands which were given out (anew) at a very small rent on the understanding that they should be policed. But as they did not pay for policing, this measure did no good.

Konig, who paid three short visits to Malacca town then—one in September, 1778, the second in February, 1779, and the third, while waiting for a boat to India, from August 11th to December 15th, 1779 (Journal of the Straits Branch of the Royal Asiatic Society, 26, p. 100), records that forest commenced just beyond the village of Chang, i.e. at four miles from Malacca town. Another writer of the same period has left it on record that "the country was an impenetrable wilderness just beyond two miles from the Fort."

At the back of the wall of forest which had grown up round Malacca, an independent development went on slowly; and the district of Naning was cultivated in the Malay way, with fingers of rice along the valleys, villages on their edges and buffaloes, and with also a certain amount of dry rice growing for which forest was burned. When the power of Malacca was strong enough, Naning sent a tribute of rice thither: when it was possible it defied both Portuguese and Dutch. Behind the forest also in the same period, Malays worked gold mines at the foot of Mount Ophir, and on finding gold also at Geminchih worked mines there from about 1760. In 1793 tin-mines were opened at Kesang. As the demand for the tin and the gold came from oversea, and as Malacca controlled the sea, these mines kept open ways to the town, which were but the narrowest tracks supplementing the Malacca river.

From the strict Dutch rule, Malacca passed into British control in 1795: and as the paragraphs above show, it was at the time no more than a fort upon the narrows of the Straits of Malacca. Britain did two things, (1) removed the embargo on growing rice, and (2) removed the fortifications. It passed back to the Dutch in 1822, useless except as a pawn for bargaining in treaty making.

During the short Dutch rule which followed, Finlayson visited it. This was in 1822 and this is what he records:—"It is half-dead" with "every third house shut up," the country not raising rice enough even with it so for its consumption. The Dutch surrendered it finally to Britain in 1825; and it was put under the administration of Penang.

Of Malacca it was written five years later that its rice-fields then reached to Rumbia at a distance ten miles on the way to Naning; and there the track plunged into forest. Again five years later as a consequence of defiance from Naning a punitive expedition advanced along the

track, its history throwing a most instructive light upon the density of the barrier of forest which Portuguese and Dutch rule had caused to grow up.

The expedition started from Malacca town for Alor Gajah, and as soon as the forest was entered found its way obstructed by felled trees and its flanks harried by its enemy in such a measure that it was deemed necessary for protection to cut a wide strip right through the forest. It was a tedious business, and the little affair advanced at the slow rate of only twelve miles in one hundred and fifteen days at the cost of one hundred thousand pounds sterling.

Griffith in 1841 or 1842 made a journey to Naning along the road that the expedition had left and found it bordered by a belt of secondary jungle one hundred yards deep on either hand.

In 1848 Balestier recorded that Malacca still produced nothing but a little rice. In 1862 Cavanagh ordered that roads should be opened to the boundaries of the Territory: and in the seventies it suddenly awoke to a great agricultural activity. Owing to the lateness of this activity, in 1883, when a Forest Department was created, the forests were found richer in timber than those of Penang and Singapore.

No Dutch botanists studied plants in Malacca unless Couperus' tract on Gambier be counted. The study of its vegetation commenced as soon as British rule came in.

There were two William Farquhars connected with Malacca during the first period of British rule. One was there as a Colonel and the other as a Major. The Major interested himself in Natural History and employed a Chinese artist to depict the plants which he found. These drawings he submitted to Jack in Penang and later to Wallich in Singapore. Jack criticised them as wanting in detail. Their fate is unrecorded. But Farquhar climbed Mount Ophir at some date before 1819, and brought back plants thence among which was the curious fern *Matonia pectinata*: to Jack he gave his specimen and Jack sent it to Wallich. It was in 1822, when he had become the first Resident of Singapore that Farquhar submitted his drawing of the plant to Wallich.

On January 14th, 1822, Finlayson reached Malacca and collected for a week. The plants then got passed into the East India house, and were distributed by Wallich between 1828 and 1832.

Gaudichaud in 1837 upon his second voyage round the world collected at Malacca: but the voyage, the purpose of which was to drop consular officers at a number of ports, was done with great haste, so that he could not collect much.

Cuming, who spent the years 1835 to 1839 upon a great collecting expedition to the Philippines islands, in the last year visited Malacca in order to go to Mount Ophir. In what month has not been ascertained.

In 1841 Griffith was appointed surgeon at Malacca and applied his tremendous energy to collecting: but he had not been long at the station when Wallich was taken ill, and in consequence he was called to Calcutta to take charge of the Company's Garden. During this period of his service he visited Mount Ophir, passing to reach it through Rim; there is an Ayer Panas near this route: but he visited also the Ayer Panas which is north of Alor Gajah. He engaged a Portuguese of Malacca named Fernandez as collector, and left him at work while he was acting for Wallich. He returned to Malacca in January, 1845, only to die a month after his arrival. His copious notes, often only in pencil, and his specimens, were bequeathed to the Company, and the notes were published as Posthumous Papers under the editing of McClelland, who clearly had in doing this a difficult task. From them it appears that Griffith himself, except in making the two expeditions as stated above, did not get far afield from Malacca town. Tanjong Kling, Kamuning, Cheng, Pringgit, Malim, Batu Berendam, Pulau Panjang, Pulau Java, and Pulau Besar, are localities recognisable in his notes and so recorded as if he himself visited them: they are all close to the town. After his return in 1845 in the short month left to him, he employed two native collectors whose names are variously spelled in the Posthumous Papers. One, apparently was a native of southern India with the name of Verapha; the name of the other was spelled by Griffith Nhingghull. The latter collected for Griffith about Alor Gajah and forwards to Tebong. In the Posthumous Papers the names of these men sometimes appear as if place names. "Tanjong" in these Papers appears to stand for Tanjong Kling; and the Ayer Panas mentioned is possibly in all cases that north of Alor Gajah.

Griffith's friend Westerhout brought plants to him from Keru between Ayer Panas and Tebong. Another friend, Sir William Norris, brought plants to him from Mount Ophir.

In 1845 Thomas Lobb who has been mentioned as having collected in Penang, collected also in Malacca.

In 1858 Jagor voyaged to Java, and upon the way stayed in Malacca from April to July. He made the journey through the forest belt to Ayer Panas north of Alor Gajah, via Ching and Rumbia, and he records that forest commenced near Rumbia about ten miles from Malacca. He also ascended the Linggi river for a short distance (Reiseskizze, 1886).

The next of the Malacca botanists was Maingay. Having accompanied the 1860 expedition to China, he on his return westwards became magistrate in charge of the Jail in Malacca; and over the years from 1862 to 1868 he collected and studied the flora very diligently, leaving a large herbarium and five note books on it, when in 1869 he was shot down in a mutiny in Rangoon. The herbarium and the notes are preserved at Kew; but by the phytogeographer it is to be regretted that he rarely recorded the places whence his specimens came.

In 1877 there was a resident in Malacca, a W. S. C. Pinwill who sent Pteridophytes to Kew. In 1879 Sir George King paid a short visit in the month of November. In 1882 Cantley commenced his study of the forests of Malacca, with the object of organising a forest department; and in 1884, the better to ascertain the composition of them he stationed there a collector named Alvins, who sent numbered plants to him in Singapore in bundles as they were prepared and dried. He is recorded as having sent about one thousand before the year was out and is recorded as having sent 1,840 in the year 1885. By the use of the numbers it is possible in a great measure to trace Alvins' collecting places. The first seem to have been in the two forests nearest to the coast, namely the reserves of Sungei Udang and Merlimau: then he moved to the more inland forests around Selandar. He collected at a Bukit Danan, which has not been identified, between two periods at Selandar: some labels (not Alvins', but those additional labels which were attached in Singapore) state it to be in the State of Sungei Ujong, but not all; and because it is known that some of these additional labels are misleading (see Ridley in Gardens Report for 1889, p. 7) there is much probability that the Bukit Danan visited by Alvins is in eastern Malacca. When the numbering had reached the neighbourhood of 760, Alvins removed to the Naning corner of Malacca and his labels bear the names of Chinana Puteh, Bukit Naning, Bukit Klana, Bukit Kandong, Bukit Payong, Gaong Talan (possibly under Gunong Tampin), Bukit Dusun Paya, and Bukit Bertam, being places close to the limits of Malacca territory in the direction of the Negri Sembilan, or perhaps some just over the border in them. Unnumbered plants, probably gathered earlier than this, bear the names of Bukit Bruang, Pulau Nangka, Pulau Dodol, and other places near Malacca town, and Bukit Panchor. When he had collected considerably in Naning, he was sent into the State of Sungei Ujong as related under square *5j*. But later still he worked in the square *7k* upon the eastern border of Malacca territory, though not wholly, for the names of Merlimau and Bukit Kajang occur; and he seems to have reached Ayer Kuning in Negri Sembilan towards Geminchih.

Upon early labels the names of Bukit Kayu Arang and Bukit Terbakar are found: the first* was in the Sungei Udang forest reserve, the second in the Brisu forest. He also labelled plants with the name of Bukit Putus, apparently indicating the hill of that name north of Brisu.

It was decided in 1886 to appoint an officer from Europe to take charge of the Malacca forests under Cantley, and Derry was selected. He served in Malacca from August of that year to 1893 collecting plants, chiefly the larger forest trees, in various parts of his charge, and had headquarters at Ayer Kroh upon the edge of the Bukit Bruang Forest Reserve, except that through 1891 his presence was required in Penang, and Holmberg held charge. In 1893 and 1894 Goodenough took charge of the forest.

Feilding when he visited Malacca and Muar in 1892 appears to have gone to the foot of Mount Ophir and to have collected at the Lubok Kadondong there.

Harvey was Resident-Councillor of Malacca from 1882 to 1894 and made a herbarium of Malacca plants, which was given to Kew at his death: he also sent plants both to the Botanic Gardens, Calcutta, and to Singapore. His specimens are not precisely localised.

In 1889 Ridley paid his first visit to Malacca, and another in 1890 and others at intervals afterwards, the last being in 1917. Upon one occasion he visited Kuala Pedas in Negri Sembilan, and upon the last the neighbourhood of Tampin. In 1892 Curtis visited Malacca, and again in May, 1900, and in April, 1901, both brief visits. Hullett also visited Malacca in December, 1883, and in April, 1888, in order to climb Mount Ophir.

Between 1914 and 1924 administrative work took Burkill for short visits in every month of the year except September and to every part of the Territory. Collecting was done as occasion offered, and the localities were numerous, so numerous that as no names were used which are not on the maps, they will not be given. In November, 1922, Holttum collected in the Bukit Sedanan forest reserve and about Tampin.

Malacca has thus been very extensively examined and it is thought that a list of the plants occurring within this square might be made ninety-six per cent. complete. It has been botanised in every part of the year. Its surface offers interesting studies in what man in such a climate as it has can produce, and in plant-successions.

---

* The Diospyros trees which gave the hill its name were removed in 1883.

SQUARE *7k.*

There is a narrow strip of Malacca territory on the western side of this square, which eastwardly extends into the States of Negri Sembilan and Johore. Mount Ophir is in the square and the greater part of the basin of the Muar river. The total land surface is about 1,200 square miles.

Naturally Mount Ophir has attracted botanists to it. Farquhar collected on it about 1818. Someone a little later supplied Mount Ophir plants to Robert Wight who himself never visited Malaya but was in service in Southern India upon the Madras Establishment. Newbold in April, 1833, ascended Mount Ophir from Asahan, and collected a few botanic specimens upon the summit which he sent to Wallich in Calcutta (Newbold's British Settlements in Malacca, 2, pp. 165-174, and Journal of the Asiatic Society, 1834, p. 48). In 1839 Cuming climbed it. In January, 1840, and again in April, 1848, Oxley climbed it. In Logan's Journal, 6, p. 636, is an account of the first of these ascents. We are told that then the virgin forest commenced at Rim; and that the gold mines, which had shortly before been destroyed, lay in a pocket amid the forest at the foot of the mountain. The ascent was by a Padang Batu—probably the well known one which many travellers have mentioned. In February, 1842, Griffith visited the mountain, not only ascending to the highest summit, but seeking plants upon the slopes of the subsidiary Gunong Mering. Oxley's second visit is the next historically, and as a result of it he sent plants to Kew. In 1853 an ascent was made by (Sir) T(homas) Braddell in the company of a botanist; but it is not known who this was. The ascent is described in Logan's Journal, 7, p. 73. In the year 1864 and again in August, 1867, Maingay climbed the mountain. There is an account of an ascent in the Singapore Free Press of March 10th, 1864. At that time the village of Asahan was unoccupied.

Cantley is said to have acquired plants from Mount Ophir, but it is not clear by what means, though his collector Alvins was at Chabau towards the end of his time. Hullett climbed the mountain in December, 1883, and in April, 1888; and subsequently gave his collections to the Botanic Gardens, Singapore. Derry climbed it in May, 1890, which month he remarks is not in a flowering season (Report on the Botanic Gardens and Forest Department for 1890, p. 22). Hervey and Ridley climbed Gunong Mering together in 1892 and in 1898 Ridley took leave in the month of December to climb Mount Ophir again. Bukit Kayara and Sungei Pauh are two contiguous localities on this trip. His Botany of Mount Ophir is in the Journal of the Straits Branch of the Royal Asiatic Society, No. 35, p. 1.

The Kesang river flows from the foot of Mount Ophir to the Straits of Malacca, and in its valley Burkill has collected upon several occasions about Chabau, Chinchin and in the State of Johore towards the Muar river. Lubok Kadondong and Rihlau are by its headwaters. Feilding was sent in 1892 to the foot of Mount Ophir to Lubok Kadondong.

In April, 1901, Curtis ascended the Muar river to Biawak.

In spite of these many visits to Mount Ophir, the botany of the square is very little known, so that there are only 150 species of the Thalamiflorae-Calyciflorae to be recorded as yet for it as against 794 for square *6k*. Now with so high a mountain in it as Mount Ophir the flora must be more than half as rich again as that of square *6k*; and on that assumption our knowledge of it appears to stand at only twelve per cent. It is certain that Mount Ophir deserves more attention.

SQUARE *8k*.

This square is entirely in the State of Johore and botanically it is very little known.

In 1892 Lake and Kelsall crossed a part of the square, having ascended the eastward flowing Sungei Sembrong, and the Sungei Kahang, they got into the westward flowing Sungei Sembrong and so to Batu Pahat. Their locality Simpai or Kampong Simpai is in the square close to the course of the railway, upon the eastern Sungei Sembrong. Sungei Malati is not remote.

In November, 1900, Ridley ascended the Simpang Kanan river from Batu Pahat as far as one of the very numerous Tebing Tinggis that exist. It is assumed that he had entered this square then.

In 1922 between November 15th and 20th Holttum collected in the square about Kluang, climbing Gunong Lambak. In 1923 Watson made a track to the summit of Gunong Belumut from the direction of Kluang, and in May, 1923, Holttum was at Kluang again and proceeded to Gunong Belumut in square *9k* over Watson's track.

Down in 190 collected on the Bekok river, probably upon the part of the river near to the railway line.

The species of the Thalamiflorae-Calyciflorae known, as the map shows, amount to only 54, which may indicate a knowledge of about six per cent. of the total flora.

SQUARE *9k*.

This square is entirely in the State of Johore, and contains Gunong Belumut. The land surface is about 1,080 square miles.

Gunong Belumut was climbed by Hervey in 1879, but it is not known what plants he collected upon it, though he recorded that he brought some down. Lake and Kelsall in 1893 mapped the Sungei Kahang and the Sungei Madek, and collected in the Ulu Kahang.

Belumut was botanised on by Holttum between May 23rd and June 1st, 1923. Watson shortly before had cut a trail from the Kluang-Mersing road to the summit, and had collected a little. This trail Holttum followed; it took him via Ulu Madek and Gunong Chemondong; he returned by Gunong Berchuak, Ulu Kahang and Gunong Beridong.

The species of the Thalamiflorae-Calyciflorae collected within the square and identified are 117 and judging therefrom the botany of it is about twelve per cent. known.

SQUARE *0k.*

Some 35 square miles of the Peninsula, being part of the State of Johore are within the square, and various small islands, of which Pulau Tinggi is the largest. Pulau Aor has been squeezed into the square, so as to avoid having to make a new index number for it.

Pulau Aor used to be a pirate haunt, a mart for the slaves that they took; and it invited a considerable population which has tilled it to the summits. Koenig in 1778 visited it, and found it thus well inhabited. In 1849 J. T. Thomson, the Government Surveyor employed in Singapore described it in Logan's Journal. Nestling close under it is Pulau Dayang.

Feilding in October, 1892, visited successively Pulau Tinggi, Pulau Aor and Pulau Dayang. Burkill in 1915 accompanied Robinson to Pulau Tinggi and spent the period from June 16th to the 20th there; but failed to reach the top of the mountain which gives to it its name. Robinson and Knight during the same period visited the islet of Pulau Sanggul or Tokong Sanggul which is immediately to the south of Pulau Tinggi.

The map shows that 53 species of the Thalamiflorae-Calyciflorae are recorded, and as the flora of the area is probably less by one third than that of Penang, it seems as if we can name ten per cent.

SQUARE *7l.*

There are only about 220 square miles of land in this square, being the coast of the State of Johore near Batu Pahat and the lower parts of the two rivers which converge upon it. There are low hills and swamp lands in the square.

Feilding visited Parit Jawa and Bukit Muar which are in the square in 1892 and Lake and Kelsall in the month of August collected a little near Batu Pahat town: and in the same year Nongchi sent orchids from the neighbourhood

to Ridley. In 1900 Ridley was at Batu Pahat town from October 31st to November 18th; and Machado with him. The following are collecting places visited then:—Gunong Banang, Gunong Penggaram, Bukit Soga, Patani Ketchil, Hadji Senawi, and the headland of Batu Pahat. From Batu Pahat town or Bandar Penggaram Ridley ascended the Sungei Simpang Kanan (Report Bot. Gardens for 1900, p. 5). In November, 1924, at the end of the month, Burkill and Haniff visited Batu Pahat town.

The map indicates 70 as the number of the Thalamiflorae-Calyciflorae known from the square; and as the flora cannot be a very rich one, we probably know 10 to 15 per cent. of it. It will be observed that collecting has only been done towards the end of the year.

SQUARE *8l.*

There are some thousand square miles of the State of Johore in this square, which is botanically almost unknown.

Lake and Kelsall crossed a corner of it when they descended the Sungei Simpang Kanan, and similarly Ridley when he ascended it, as recorded under the heading of the last square. Burkill and Haniff collected in the end of November, 1924, a few plants in it at Ulu Benut and on the west of Sedenak.

SQUARE *9l.*

The surface of this square is entirely of land, and in the State of Johore. Gunong Pulai is towards the south-west and Gunong Panti towards the east.

Burbidge and Murton climbed Gunong Pulai in August, 1877 (Burbidge, Gardens of the Sun, 1880, p. 31). In the latter part of 1892, Lake took a plant collector thither from the Botanic Gardens, Singapore. Ridley, in December, 1904, took leave and spent a week upon it. In 1922, when extensive clearings were being made for waterworks, two other collectors, Mohamed Nur and Kiah, were sent thither from the Gardens. They collected along the Sungei Pulai Dua, on Gunong Pulai Duatas, on Bukit Abu Bakar and to the summit. Best visited the summit on December 18th, 1922, and Holttum on November 16th, 1924. Sedenak railway station visited by Ridley in August, 1908, is within the square to the north of Gunong Pulai.

Burkill and Haniff collected in the end of November, 1924, on the Scudai river to the south-east of Gunong Pulai.

Vesterdal collected at Mount Austin to the north of Johore Bahru.

In 1880 Kunstler visited Gunong Panti in June. In December, 1892, Ridley climbed it from Kota Tinggi, and again in 1910 with le Doux. Holttum in March, 1925,

climbed it also with le Doux, and Haniff in December, 1925, and Holttum in February, 1926.

Gunong Muntahak which is near was visited by Kloss.

Southwards and right upon the edge of the square is Panchur where Ridley collected in 1900.

King in 1879 with Hullett visited Jaffaria which is somewhere within the southern edge of this square; and in May, 1903, Ridley visited Castlewood, which is not far away.

The total number of species of the Thalamiflorae-Calyciflorae collected is on the map 242 and our knowledge judged by this may be twenty per cent.

SQUARE *0l.*

There are about 450 square miles of the State of Johore in this square, all but botanically unknown.

It has been said that Lake and Kelsall collected on the Sedili river; but that statement is erroneous. Feilding in 1892 and Down are the only persons who have collected upon it and they only a very little.

Ridley visited Johore Lama which is upon the western margin in October, 1900, from Pandim in square *9l.*

SQUARE *8m.*

There are only 60 square miles of the State of Johore in this square; it consists of very low-lying land. Kukob, which is the chief place in it, and the Tempayan river were visited by Ridley in April, 1908, and the Penerok river by Burkill on August 10th, 1913, and January 25th, 1914.

SQUARE *9m.*

This is the square of Singapore Island; and contains with it a small part of the State of Johore wherein is the town of Johore Bahru.

The part of Johore which is in the square has been visited by Ridley at such localities as Tanjong Bunga, Tanah Runto, Tanjong Kupang and Tanjong Merawan. King, Hullett and Kunstler visited Johore Bahru.

Raffles at his taking over of Singapore collected plants, as Jack tells us in one of his letters to Wallich, being three species of Nepenthes: then Jack himself visited Singapore in June, 1819 (*vide* Journal of the Straits Branch of the Royal Asiatic Society, No. 73, p. 177). At this time Singapore Island was so completely "covered with jungle" that there was found to be clear only "a small spot on the eastern bank of the river barely large enough to pitch the tents on" which Raffles had brought with him.

Wallich in 1822 voyaged to Singapore expecting to meet his friend Jack, but Jack was dead then. Farquhar, who has been mentioned as having botanised in Malacca, was then Resident; and Wallich enjoyed his friendship as he had that of Raffles. He collected with his usual energy from August to the end of November. In the same year, but from January 20th to 25th, Finlayson had been in Singapore and collected. Wallich's specimens, Finlayson's and such as Jack had sent to Wallich, were among those distributed from London by Wallich between 1827 and 1832.

Gaudichaud was the next botanist to touch at Singapore, and that very lightly in the month of February, 1837. In 1835 and 1839 Cuming entered the port in his little exploring schooner, and collected, but chiefly living plants (*vide* Gardens Bulletin, 2, p. 441). In 1845 or 1846 Thomas Lobb likewise collected.

At this time the cultivators of gambier and pepper were completing the overrunning of the island with their temporary cultivation: the forest had suffered most extensive destruction both to get virgin soil for the pepper and fuel for the gambier boiling.

Oxley towards the end of a residence in the East of twenty-five years entered into correspondence with Kew, and sent plants: he sent plants also to Voigt in Bengal. A contemporary of his was Motley who during his residence of a year in Borneo, visited and collected a little in Singapore: this was apparently in the year 1852. Early in 1857 Sir Robert Schomburgk passing through the port collected for Kew. In 1861 Thomas Anderson doing the same collected and so also Kurz in December, 1863. In May or June, 1865, Beccari reached Singapore upon his way to Borneo and apparently he visited Singapore more than once afterwards, using these opportunities for collecting. In September, 1867, Maingay, passing through Singapore collected: and Wawra likewise passed through the port thrice, once at the end of 1872 and twice early in 1873; and also collected. In 1879, in August and September, Sir George King collected in Singapore.

In Wight's herbarium were some plants labelled "Singapore, Dawood." It is suspected that a native collector named Daud had got them at the instance of Wight's brother.

The continuous botanising of Singapore commenced in 1875 when Murton was appointed to the post of Superintendent of the Botanic Gardens. He was ambitious of producing a Flora of the island, and probably collected with diligence; but destroyed his collections when leaving Government service. In his time the neighbourhood of the Gardens seems to have been covered either with secondary

forest or with forest greatly deteriorated by the removal of timber. Cantley succeeded Murton in 1880; and set to work at the investigation of the flora: but his impaired health drove him to England in 1881, whither he took, to work at in the Royal Gardens, Kew, as many specimens as he could accumulate. Returning in 1882, he began to train a plant-collector, and tried to set in order what Murton had left; and in March of the year he was instructed to draw up recommendations for the care of the forests and forest lands of the Straits Settlements. His report on them was out in July, 1883; and it contains an interesting list of timber trees then verging on extinction in Singapore island. (Reports on the Forests of the Straits Settlements, appendix). At that date "such Crown forests as remained uncut were widely distributed in isolated patches over the island.....of various sizes from half an acre or so to twenty acres" and the Government had difficulty in selecting areas for economical conservation, so much so that not one half of these first suggested actually were included within the final selection as Reserves; and if reference be made to Ridley's Annual Report on the Botanic Garden and Forest Department for the year 1889, p. 10, it will be realised that failing to find adequate virgin forest that which was reserved contained very little good forest.

When Cantley died, Ridley in 1888 succeeded him as Director of Gardens and Forests. Unfortunately he found that much of what had been collected had perished: and this being so, the Singapore Herbarium is almost entirely of the latter's creating. Tassim Daud worked as a plant collector under him and as herbarium keeper until 1895; and Goodenough was temporarily under him in Singapore in 1895 and 1896. He frequently sent trained native plant-collectors out with exploring parties willing to look after them.

Hullett, who had been stationed in Singapore for a number of years, presented his herbarium to the Singapore Gardens when leaving the East in 1889.

Burkill succeeded Ridley in 1912. He was joined by Baker for a part of 1917, by Chipp in 1919 and 1920, by Holttum in 1922, and by Henderson in 1924. Working under these were the following who collected also, Ahmed bin Hassan, Kastawi bin Jalil, Mohamed Nur bin Mohamed Ghose, Ahmed bin Hadji Omar, Subramanian, Kiah bin Hadji Mohamed Salleh and others and their names will be found on plant-labels.

Visitors who have collected in Singapore since 1880 have been Scortechini who was on the island in 1886; Max Fleischer in 1898; Raciborski in 1899; Engler in 1905; Matthew in 1913.

The last named visited Johore also. In 1901 there was resident in Johore Jansen who conceived the idea of collecting sets of plants for sale; but seems not to have carried it out, though plants collected by him are conserved at Copenhagen.

In the year 1900 Ridley published a Flora of Singapore in the Journal of the Straits Branch of the Royal Asiatic Society, No. 33, p. 27, and in 1901 he published some addenda in No. 35, p. 84.

It is interesting that the lesser the land surface the further from typical high forest is the vegetation upon an islet: and this is illustrated by Holttum's account of the plants upon Pulau Jong (Singapore Naturalist, Vol. I, 5. p. 47.) Pulau Jong is a few miles removed from the south shore of Singapore island.

Very little has been added since Ridley's Flora; so little that the island itself may be held as about ninety-nine per cent. known: but within the square is a part of the State of Johore, which is scarcely known, and taking it into consideration it may be assumed that the square is about ninety-six per cent. known.

SQUARE *0m.*

The land surface within this square is only about 160 square miles of the State of Johore. Opposite to it are parts of the Dutch islands of Pulau Batam and Pulau Bintang which are outside our consideration.

The square was overrun by pepper and gambier plantations in the years 1840-1850 and other planting has followed. Ipecacuanha was grown there about 1880-1890 at Pinyerong: and it was probably on a visit to the plantation that Cantley got the Johore specimens which he took to Kew in 1882: they are dated February.

Feilding visited Tanjong Surat which is north-north-east of Changi in 1892. Ridley in 1890 collected over the island of Pulau Tekong.

It is chiefly from the collections of the last that we know so many of the Thalamiflorae-Calyciflorae of the square as 48. It indicates about ten per cent.

THE COLLECTING PLACES.

This list serves as an index to the foregoing pages and is meant to be used in the herbarium as a means of getting, with the aid of maps, as much information as possible out of the localities given upon labels.

Alor=a ford
Gajah—6k
Sta—2b
Ampang (Ipoh)—4e
Anak Bukit—2b
Ara Kudah—3d
Aring—6d
Aroa islands—3j
Ayer=water or stream
Hangat—1b
Hitam—8h
Kroh—6k
Kuning (Taiping)—3e
Kuning (N. Sembilan)—6j
Panas (two)—6k
Puteh—8g
Raja forest—5h
Assam Kumbang—3e
Asun—2b

Bagan Datoh—3g
Bagan Serai—3d
Bahau forest—6j
Baling—3c
Balok—8g
Bandar Matahari—2c
Bandar Penggaram—7l
Bandar Telok Anson—4f
Bangi—5j
Batang Benar—5j
Batang Berjuntai—4h
Batang Padang—4f
Bator Kelantan—6e
Batu=rock
Balai—6g
Bau—5e
Berjongkong—1b
Bunga—1b
Caves—5h
Gajah—4f
Hampar—3e
Kurau—3e
Pahat—7l
Papan—5e
Talam—5g
Tiga—5h
Tugoh—3e
Bedong—3c
Behrang forest—5g
Bekok—8k
Belimbing (Legeh)—5b
Belimbing (Malacca)—6k
Belingu—6h
Bemban (nr. Triang)—6j
Benchah forest—6f
Benom mountain—6g
Benta—5f
Bentong—5g (5h)
Benus valley—5h
Benut—8l
Beranang—5j
Bernam river—3-5g
Beserah—8g
Besih Hangat—2b
Betong—4c
Biawak—7k
Bidor—4f
Bikum—4g
Bilut reserve—5g
Bintang—7h
Biserat—4a
Blanja—3f
Blanda Mabok—3e
Blay Manis—6f
Bohei—8h
"Box" hill—3e
Briah—3d
Bruas—3f
Budu—6f
Bukit=a hill or ascent
Abu Bakar—9l
Banang—7l
Belata—4g
Bertam—6k
Besar—4a
Besih Hangat—2b
Birch—3e
Bruang—6k
Cheraka—4h
Danan—6k
Duri—7h
Dusun Paya—6k
Etam—5h
Fraser—5g
Galing—8g
Goh—8g
Gowa—4a
Itam—5h
Jalor—4a
Jelatah—5e
Jitan—8k
Kajang—6k

Bukit—(*contd.*)
Kandong—6k
Kapis—8g
Kayara—7k
Kapayang—4e
Kapayang—5j
Kayu Arang—6k
Klana—6k
Kuda—5h
Kutu—5g
Lagi—2b
Lasing—5j
Linggung—6j
Mertajam—2d
Muar—7l
Mudom—7l
Naning—6k
Nuang—5h
Nyor—5h
Panchor—6k
Papan—6d
Patani—7l
Payong—6k
Penggaram—7l
Pinang—2b
Putus—6k
Raja Wang—2b
Raka—5g
Ruang—2b
Sedanan—6k
Selat Panchor—1b
Sembilan—4b
Soga—7l
Sutu (Setul)—5j
Tangga—5j
Tanjong—2b
Tanah Abang—9k
Tapang—4a
Telor Jambu—2b
Temangan—6c
Terbakar—6k
Ubi—8g
Wang—2b
Wok—
Bundi—8f
Burau—1b
Butang islands—1a
Butong island—2d

Cameron's Plateau—4f
Cape Rachado—5k
Castlewood—9i
Caulfeild's Hill—3e
Chabau—7k
Chanderiang—4f
Changkat=a shallow; rising ground
Jerin—3e
Jong—4g
Mentri—4g
Serdang—3e
Channing—6d
Cheka river—6f
Chemor—4e
Cheng—6k
Cherating river—8f
Chinchin—7k
Chineras—6f
Chini—7h
Chirana Puteh—6k
Chupeng—2b

Darat Selah—8h
Degong—4f
Dindings—3f
Dong—5g
Durian Pipit—3d
Durian Sabatang—4f
Durian Tawar—6j
Dusun Gajah—2c
Dusun Tua—5h

Endau river—8j, 9j
Enggor—3e

Fraser Hill—5g

Galas valley—6d
Gali—5g
Gaong=a hollow
Talan—6j, 6k
Gapis Pass—3e
Garawang—5h
Gemas—7j
Gemenchih—6j
Genuang—7j
Ginting=a narrow or pass
Bidai—5h
Kabok—2a
Peras—5h
Sempak—5h
Gopeng—4f

Goa=a cave
Batu—5h
Chirita—1b
Kechapi—5e
Ninneh—6e
Panjang—5e

Great Redang island—6c
Grik or Grit—4d
Guai—6f
Gunong=a mountain
Arang Kayu—3e
Arang Para—3e
Angsi—6j
Bal—4e
Banang—7l
Batu Brinchang—4f
Batu Puteh—4f
Bechua—9k
Belumut—9k
Benom—6g
Berekeh—4e
Beremban (Wray's)—4f
Beremban (Ridley's)—4f
Beremban (Alvins')—6j
Beridong—9k
Berumber=Beremban (Wray's)—4f
Bintang—3d
Bongsu—3d
Bubu—3e
Bujong Malacca—4f
Chabong—4e
Chemondong—9k
Chindrang—1b
Chini—7h
Chunam Prah—4f
Geriang—2b
"Haram"—3e
"Haram Para"—3e
Ina—4c
Inas—3d
Janeng—8j
Jerei (Kedah Peak)—2c
Kayara—7k
Keledang—4e
Kendrong—4c
Kerbau-Korbu
Kluang Terbang—6g
Korbu—4e
Lambak—8k
Ledang—7k
Melitang—
Mengkuang Lebar—5h
Mentahak—9l
Menuang Gasing—5h
Merah—3d
Mering—7k
Meriong—7k
Mesah—4f
Panti—9l
Penggaram—7l
Pondok—3e
Pulai—9l
Pulai Duatas—9l
Rajah—5g
Rapat—4e
Raya—1b
Sennyum—6g
Stong—5d
Tahan—6e
Talan—6k
Tampin—6j
Terbakar—4f
Titi Basah—4c
Tunggal—3f
Ulu—4f
Ulu Kali—5h ? 5g
Yong Blar—4e
Gurun—2c

Hadji Senawai—7l
"Haram"=Arang
Hermitage Hill—3e
Hutan Melintang—3g
Ijok—3d

Ipoh—4e

Jaffaria—9l
Jalor—4a, 3b, 4b
Jambu—8g
Jambu lorong—
Jelei river—6f
Jellam Panjang—6h
Jenum—2b
Jeram Panjang (S. Lebir)—6d
Jerantut—6g
Jering State—4a, 5a
Jitra—2b
Johit-Rambei forest—5g
Johol—6j

Johore State—7-0k, 7-0l, 8-0m
Johore Bahru—9m
Johore Lama—0l
Jor—4f
Juasseh—6j
Jugra—4j

Kadondong—6g
Kahang river—9k
Kajang—5j
Kal=Kol
Kala Kiri—4a
Kalambalai—8h
Kalindi—4f
Kampar—4f
Kampong=village
Bandar Bahru—3f
Gajah—4f
Kobang—6d
Kota (on Plus river)—3e
Kota (Kelantan)—6b
Parit—6c
Pianggu—9j
Simpai—8k?
Kamposa—6b
Kamunting—3e
Kamuning—4e
Kanching—5h
Kangar—2b
Kapayang—5j
Karak—6h
Katapang—8h
Katapang—7k
Kechau river—6f
Kedah State—2a, 1-4b, 2-4c, 3d
Kedah Peak—2c
Kelantan State—6b, 5-6c, 4-6d, 4-7e
Kelantan river—6b, 6c
Kelumpur—6e
Kemaman—8f
Kendong—6j, 6k
Kenering—4d
Kepala Batas—2b
Kepis forest—6j
Kepong—5h
Kerling—5g
Khol—6f
Kinta—4f
Kertai—4d
Keru—6k
Klang—4h
Klang Gates—5h
Klang water catchment forest—5h
Klian=a pit
Intan—4c
Trus—2c
Kluang—8k
Kluang Terbang—6g
Kota=a fort, or locally a cave (Kota, Taiping)—3e
Bahru (Kelantan)—6b
Bahru (Kinta)—4f
Bahru (Rahman)—4b
Glanggi—6g
Tampan—3d
Tinggi—9l
Tongkat—6g
Sarong Semut—2c
Stia—3f
Kramat (Ridley's at Pekan)—8h
Krian—2d, 2e
Kroh—4c
Kuala=rivermouth
Aring—6d
Bedong—6e
Bera (Pahang)—7h
Bera (Perak)—
Brawas—8g
Brok=Bera
Burau—1b
Depang—4f
Dong—5g
Endau—9j
Endong—6d
Essam—6b
Kahang—8k
Kangsar—3e
Kedah—2b
Kendrong—4d
Kerteh—5e
Krai—6c
Krau—6g
Kuah—1b
Kubu—5g
Kurau—2e
Langat—4j
Lebir—6c
Lepar—8h
Limau Nipis—6d

Kuala—(*contd.*)
Linggi—5k
Lipis—6f
Luit—7g
Lumpur—5h
Mahang—8g
Malaka—1b
Manis (upper Pahang R.)—6e
Manis (lower Pahang R.)—6f
Miang—8h
Muda—2c
Pahang—8g
Pedas—6k
Pertang—6e
Pilah—6e
Rek—6d
Relai—6d
Sameh—6d
Sawar—5j
Sekim—8h
Selangor—4h
Semantan—6h
Sembrong—9k
Tahan—6f
Tekam—6g
Teku—6e
Tembeling—6f
Tenok—6e
Wok—4f
Kuang—5h
Kuantan—8g
Kukob—8m
Kulat (Ridley's)—9l
Kulim—3d

Labu—5j
Lahat—4e
Lala Terlong—6e
Langat—4j
Langat valley—5h
Langgar—2b
Langkawi—1b
Larut—3e
Lawin—4d
Lebir valley—6d
Legeh State—4-5b, 5c
Lenggong—3d
Liang river—5g
Linggi rivermouth—5k
Linsum—5j
Lubok=a pool
Chini—6k
Kadondong (Mt. Ophir)—7k
Kadondong (Pahang)—8g
Lanjut—6h
Merbau—3e
Paku—7h
Pelang—6f
Tamang—4f
Lumut—3f
Lunas—3d

Mahang—8h
Malacca territory—6k, 7k
Malacca town—6k
Manchis—6h
Mantin—5j
Matang—3e
Mengkibol—8l
Menglembu—4e
Menuang Gasing—5h
Menyala forest—5k
Merlimau—6k
Mersing—9k
Mesa—5e
Minyak Buku—7l
Morib—4j
Mount Austin estate—9l
Mount Ophir—7k
Muar river—6j-7k
Muar town—7k
Muda river—2c

Nakawn Sritamarat—4a, 3b
Nawng Chik—4a
Negri Sembilan—5-6h, 5-7j, 5-7k
Nerang—3b
Nipa Bay—0j
Nyalas—7k

Padang=open space
Batu—7k
Besar—1b
Rengas—3e
Sarai—3d
"Pahang track"—5g
Pahang State—4-7e, 4-8f, 5-8g, 5-0h, 7-0j, 9k
Pajam—5j

Panchur—9l
Pandim—9l
Pangkor—3f
Pantai (Kelantan)—6b
Pantai (N. Sembilan)—6j
Parit forest—3f
Parit Jawa—7l
Pasir=sand, a sandy beach
Panjang forest—5k
Panjang Ulu—3f
Puteh forest—5k
Loyang—6g
Salak—3f
Pasoh—6h
Patani or Pattani States—4-5a, 3-6b, 5c
Patani Ketchil—7l
Patani town—4a
Pegang—8h
Pekan—8h (8g)
Pelangai—6h
Penang—2d
Penarak—1b
Penerok estate—8m
Pengkalan=a landing place
Bahru (on Bruas river)—3f
Kazai—8h
Kempas—6k
Penjom—6f
Penyabong—9j
Perak State—3-5c, 3-5d, 2-5e, 3-5f, 4-5g
Perhentian Tinggi—5j
Perlis State—2a, 2b
Permatang Bertam—2d
Petasih, nr. Triang—6h
Pianggu—9j
Pinang Tunggul—2c
"Pine-tree Hill"—5g
Pinyerong—0m
Plus river—4e
Pondok Tanjong forest—3d
Pontian—8l
Port Dickson—5j
Port Swettenham—4h, (4j)
Prai—2d
Pramau—8g
Province Wellesley—2-3c, 2-3d
Puket circle—1-2a
Pulai—5e
Pulai mountain—9l
Pulau=an island
Adang—1a
Ampak—1b
Aor—0k
Besar—6k
Chengei (Chenggal)—6g
Chupak—1b
Datoh—6f
Dayang—0k
Dayang Bunting—1b
Dodol—6k
Hujong Duri—1a
Jarak—2g
Jong, Langkawi—1b
Jong, nr. Singapore—9m
Jellam—6h
Ketam—8d
Kinchi—6f
Lallang—3f
Lidi—1b
Manis (upper Pahang R.)—6f
Manis (lower Pahang R.)—8g
Nangka—6k
Nior Stali—1b
Nipis—1a
Padang—6f
Pinang (Redang Is.)—8c
Rawei—1a
Rumbia—3f
Rumput—8g
Sakijang—9m
Sanggul—0k
Segai—1b
Songsong—2c
Tawar—6g
Tekong—0m
Tengah—1a
Terutau—1a
Tiga (Perak river)—3f
Tijau—6f
Tinggi—0k
Tirie—1b
Tiuman—0j
Ubin—9m

Quedah=Kedah

Rahman State—4-5a, 4b, 4c
Rajah Itam—3f

Rantau—5j
Rantau Panjang—4h, 5h
Raub—5g
Rawang—5h
Rawei island—1a
Redang islands—8c
Reko woods—5j
Relau Tujor—3e
Rembau—6j
Renchong—8h
Renggam—8l
Rihlau—7k
Rim—6k
Riverside—6c
Rompin river—8j
Rumbia—6k
Rumbia island—3f
Rungkup—3g

Sai State—5a, 5b
Salak—4e
Salak (Kuala Lumpur)—5h
Sawngkla—3a
Scudai river—9l
Sedenak—8l, 9l
Sedili river—0l
Selama—3d
Selandar—6k
Selangor State—3-5g, 4-5h, 4-5g
Selangor river—4h, 5g
Selaru—6j
Selinsing river—3e
Semangkok Pass—5g
Semantan—6h
Sembilan islands—3f
Senaling—6j
Senaling Inas forest—6j
Senawang—5j
Sendayan—5j
Sennyum—6g
Sepang—5j
Serdang—5h
Seremban—5j
Serendah—5h
Serom—8k
Serting forest—6j
Setul (Siam)—1-2a
Setul (N. Sembilan)—6j
Siliau—5j
Siminyih—5h
Simpai—8k
Simpam river—5g
Simpang=a possibility, parting ways
(Simpang nr. Taiping)—3e
Ampat in Krian—3e
Kanan river—7l
mines—5g
Simpit—3f
Singapore island—9m
Sira Rimau—3d
Sirusa—5j
Sitiawan—3f
Slim—4g
Sungei=river
Bagu in Tiuman—0j
Batu Asah—
Bau—9k
Bera—7h
Benchah—6f
Bertam—4f
Biku—8k?
Buloh forest—5h
Cheka—6f
Galas—6d
Jelei in Pahang—5-6f
Jelei in N. Sembilan—6j
Jerneh—6k
Kahang—8k
Kaloh—5e
Keluang—2d
Kenering—4d
Kertai—4d
Kesang—7k
Keteh—6e
Kulim—4d
Lebir—6d, 6e
Lenggin—8k?
Lepar—7g
Liang—5g
Limau—3e
Madek—9k
Mahang—8h
Malati—8k
Meang—8h
Merapoh—5e
Menyala—5k
Morai—0m
Njing—4e
Patani—2c

Sungei—(*contd.*)
Pattani—4a, 4b
Pauh—7k
Paut—6f
Penerok—8m
Perting—5g
Piah—4d
Pinang (two in Penang 1s.) —2d
Pinang (in Pahang)—
Pulai Dua—9l
Puyu—3f
Raya—4e
Renong—6d
Repas—5g
Segari—3f
Sekin—8j
Sembrong (eastward)—8-9k (westward)—8k, 7-8l
Simpang Kanan—8k, 7-8l
Simpam—5g
Singapore—9m
Siput (Kuala Kangsar)—4e
Siput (Kinta)—4f
Tahan—6f
Tawar in Tiuman—0j
Teku—6e
Tembeling—6f
Tenok—6f
Tras—5g
Tukang Sidin—4f
Udang (Malacca)—6k
Udang (Terutau)—1a
Ujong State—5-6j, 5-6k
Yu—5e
Sungkai river—4f
Tahan river—6f (6e)
Taiping—3e
Tambun—4e
Tampin—6k
Tanah Runto—9m
Tani State—4a
Tanjong=a promontory
(Tanjong of Griffith=T. Kling)
Agas forest—5k
Antan—6g
Api—8g
Bunga—9m
Duatah in Tiuman—0j
Gajah Mati—8g
Gul—9m
Hantu—3f
Kling—6k
Kupang—9m
Malim—5g
Medang—8g
Merawang—9m
Musa—6g
Neru—1b
Rambutan—4e
Sireh—
Surat—0m
Tembeling—8g
Telok Lalu—6d
Tuan—5k
Tapah--4f
Tasek=a lake
Chinik—7h
Enak—1b
Gelugor—3d
Tebing=a high river-bank for landing
Tinggi (on Kangar R.)—2h (on Simpang Kanan R.)—8k
Tebong—6k
Tebong forest—6j
Tebrau river—9l
Tekong—0m
Teku—6e
Telaya Tujoh—1b
Telapak—
Telok=a bay
Telok forest—4j
Anson—3f, 3g
Apau—1b
Bahru—3g
Datai—1b
Gadong—4j
Kertang forest—3e
Lalu-6d
Noh=Wau
Sera—3f
Sisik-8g
Siun—1b
Udang—1a
Wau—1a
Telom river (Ridley's)—4f
Telok Jambu—2b
Telok Malati-8h

Telok Pinang—4e
Telubin river—5a
Temengor—4d
Temerloh—6h
Temiang–6d
Temiang (Nr. Seremban)—5j
Tembeling river (lower)—6f
Temoh—4f
Temoyang—1b
Tempayan—8m
Tengarok—9k
Tenok—
Tepa State—3-4a, 3b
Terutau—1a
Tiuman—0j
Tokong=a rock
Sanggul—0k
Tomo—5c
Tras—5g
Tremangan—5b
Trengganu State—6-8c, 6-8d, 7-8f
Trengganu town—8d
Triang forest—6j (6h)
Trolak—4g
Trong—4e
Tupai—3e

Ulu=headwaters of a stream
Batu Pahat—8l
Bendol—6j
Benut—8l
Bera (in Perak)—5g
Bera (in Pahang)–
Bubong—5g
Chineras—6f
Gombak—5h
Kahang—9k
Kal—Kol
Kenering—4d
Kerling—5g
Kol—5g
Langat—5h
Madek—9k
Pedas—6j
Petasih—6j
Rembau—6j
Sapetang—3e
Sedili—91
Selama—3d
Selangor—5g
Slim—5g (5f)
Tekam—7g
Utan Melintang—3g

Waterloo estate—3e
Weld's Hill—5h

Yan—2c

"THE PALMS OF BRITISH INDIA AND CEYLON."

The volume published under the above title by the Oxford University Press comes from the able pen of Father E. Blatter. Having lived for many years in India he has had exceptional opportunities to study both indigenous and introduced species of the Palm family. This, coupled with a keen interest in the subject, has resulted in the production of a book, useful alike to the botanist and the layman. Much useful information is contained in the volume, well supported by numerous photographs and figures which are a very great help for identification purposes.

The introduction contains much useful information (i) in regard to the Geographic Distribution of Palmae generally, (ii) a short history of the exploration of the Palm flora in India together with a detailed account of its distribution and (iii) a general description of Palms couched in popular language.

The remainder of the book is devoted to (i) descriptions, (ii) considerable information concerning the economic value and uses of some species with histories and legends concerning them and (iii) photographs and figures. The descriptions generally, are very good and are set forth in scientific terms. Keys for identification purposes have been utilised in dealing with all genera and to a lesser extent, for the species. The generic keys are of necessity couched in botanical terms. Specific keys have been treated less scientifically, being in most cases based on general characteristics. Similarly, in a few instances the distinguishing features of two species have been contrasted or tabulated side by side. These, together with the many admirable photographs, should be of considerable assistance in the identification of species and will certainly be welcomed by the layman. This work might have been applied with good results to all genera in which two or more species are mentioned. The economic uses and importance of several of the better known species are dealt with in detail, especially in the cases of the Coconut, Betel Nut, and Date Palm. The histories and legends connected with these latter, are mentioned at length and give an interesting insight into the important part played by these plants in the lives of the natives, past and present. Cultivation is briefly touched upon, that dealing with tropical planting being of most value. Considerable work has been put into the compilation of lists of common and local names which should be of considerable use for determination purposes. No review would be complete without mention of the

admirable series of photographs included in the book; they should make identification a much easier matter. These are supplemented by numerous figures dealing with the morphology of flowers, etc., as aids to identification.

The author is to be congratulated on the production of a book useful alike to the botanist and the layman, a by no means easy task.

F. FLIPPANCE.

RELATIVE HUMIDITY

of the air at the Botanic Gardens, Singapore, from wet and dry bulb hygrometer readings made daily at 9 a.m. during the year 1926.

Date	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	90	75	71	74	80	78	71	79	89	86	83	72
2	98	69	71	70	69	93	75	77	78	83	65	76
3	98	67	76	76	81	95	68	83	74	77	74	78
4	84	73	83	78	91	93	76	72	74	67	85	77
5	84	74	75	76	79	95	79	83	77	75	83	83
6	88	70	68	72	73	85	83	91	76	95	68	79
7	82	64	72	79	76	72	90	89	85	77	69	72
8	82	67	82	71	76	90	79	75	95	67	72	74
9	76	73	75	67	72	76	79	77	73	76	74	75
10	74	71	75	72	74	72	76	78	77	79	68	71
11	68	69	74	67	68	76	76	84	75	85	76	74
12	69	69	76	69	76	76	98	87	76	95	72	91
13	71	86	77	72	73	93	83	81	88	77	77	83
14	71	83	74	76	81	74	75	83	87	72	76	95
15	81	79	74	79	80	83	74	81	77	70	95	72
16	82	77	73	76	71	72	82	75	72	88	77	93
17	82	79	91	69	76	93	85	72	85	84	78	72
18	73	71	74	95	95	70	91	90	95	98	95	73
19	74	77	72	73	85	83	79	85	84	79	83	80
20	95	81	79	91	93	76	98	79	91	72	95	79
21	75	77	79	83	79	76	95	77	79	83	76	91
22	93	87	64	73	76	81	74	79	75	83	89	78
23	77	74	74	67	91	76	75	76	95	81	87	98
24	75	79	77	67	95	93	91	72	79	83	68	87
25	93	77	74	69	72	76	87	98	79	79	69	88
26	93	73	77	67	71	77	77	85	76	95	67	90
27	79	75	79	72	70	77	77	75	83	76	78	78
28	83	70	72	73	72	85	75	77	72	70	72	89
29	75	..	70	74	76	76	79	75	79	78	77	98
30	74	..	70	91	75	87	95	74	98	82	81	81
31	74	..	72	..	72	..	98	85	..	84	..	88

Mean for the year 79.

RAINFALL

at the Botanic Gardens, Singapore, during the first half of the year 1926.

Readings taken at 9 a.m., and expressed in inches.

Date	January	February	March	April	May	June
1	1.00	...	.01	.01	.68	.01
2	.73	...	...	...	...	.67
3	1.36	...	...	.01	.45	.28
4	.02	...	.30	...	...	.28
5	.24	...	.03	.86	1.26	.27
6	...	...	.01	.25	.01	1.11
7	...	...	...	.01	trace	...
8	...	...	.05	...	...	.25
9	...	...	.65	trace	...	.01
10	...	...	...	...	.28	...
11	...	...	...	...	...	...
12	...	...	...	...	trace	...
13	...	.02	.09	...	.42	.14
14	...	.56	.05	...	.07	.30
15	.02	.99	.15	...	.26	...
16	...	...	...	.20	...	...
17	.24	...	.03	...	.02	1.30
18	.01	...	.02	.61	.05	1.17
19	...	...	.01	.01	.55	trace
20	.93	...	1.39	.17	.36	.14
21	.08	...	...	.14	...	...
22	.36	2.71	.01	.66	.44	..
23	trace	...	...	...	.05	...
24	.10	1.07	...	...	.30	.27
25	.02	.32	...	...	trace	trace
26	1.36	...	.06	2.02	...	...
27	.02	.03	.16	...	...	trace
28	...	...	.01	...	.09	.06
29	trace	...	...	.06	.02	1.01
30	...	...	.04	.10	...	.01
31	..	...	...	...	...	...
Total ...	6.49	5.70	3.07	5.11	5.31	8.39

RAINFALL

at the Botanic Gardens, Singapore, during the second half of the year 1926.

Readings taken at 9 a.m., and expressed in inches.

Date	July	August	September	October	November	December
1	.03	.03	2.79	.03	..	.03
2	..	..	trace	.01	..	.01
3	..	.85	.22	..	..	.03
4	trace	..	trace	.15	.03	.47
5	.21	.65	.01	..	..	.01
6	2.15	1.28	..	.83	..	.42
7	.60	.04	.23	.04	.17	.11
8	.07	trace	1.57	..	.19	.05
9	..	..	.78	..	.02	.15
10	.21	..	..	..	..	.01
11	..	.26	..	trace	..	.29
12	3.11	trace	..	.50	.05	..
13	.05	..	.39	.62	.17	.02
14	..	..	.17	..	..	1.65
15	..	.01	.88	..	.28	..
16	..	..	..	1.16	.02	.05
17	..	..	.31	.19	1.35	..
18	..	.30	1.05	.78	3.19	1.33
19	.01	.01	.01	.92	.04	trace
20	1.82	.21	.07	trace	.49	..
21	.44	.01	1.65	..	trace	.07
22	.01	..	..	.04	1.51	1.05
23	..	trace	1.54	..	trace	1.61
24	.63	..	.05	1.80	.06	.01
25	.14	.77	..	trace	..	.15
26	..	.02	.06	.42	.01	.50
27	.24	trace	.14	.01	.47	trace
28	.39	..	..	..	..	.66
29	..	..	.04	trace	1.02	1.17
30	.86	.15	1.30	.20	.01	.09
31	.39	.17	..	..	..	.08
Total ..	11.36	4.76	13.26	7.70	9.08	10.02

RAINFALL

at the head of the Waterfall Gardens, Penang during the first half of the year 1926, in inches.

Readings taken at 8 a.m. and credited to the date in which the twenty-four hours begin. Data kindly supplied by the Municipal Commissioners, George Town, Penang.

Date	January	February	March	April	May	June
1	..	..	..	.06	..	..
2	..	..	..	..	.17	.05
3	..	..	..	..	.05	.09
4	..	..	.55	1.02	..	..
5	..	..	..	.65	..	..
6	..	..	..	.03	..	4.36
7	..	..	..	.05	..	1.00
8	..	..	.76	1.64	..	.22
9	..	..	..	.03	.03	1.22
10	.03	..	..	.05	..	..
11	..	..	..	..	..	.06
12	..	..	..	..	1.86	..
13	..	..	2.35	..	.03	.67
14	..	..	.05	.23	.10	.03
15	..	.30	.04	.03	..	..
16	..	..	..	..	.90	.04
17	.13	..	.06	.65	.11	.17
18	..	..	..	..	.12	..
19	..	.12	.97	1.78	..	.03
20	.07	..	.17	.23	..	1.50
21	..	.03	.03	..	..	..
22	.05	..	..	1.99	.18	..
23	.92	.07	..	.06	..	.15
24	..	.70	..	.04	.06	..
25	..	..	..	.03	.93	.08
26	.05	..	..	.73	..	.03
27	..	.22	..	.20	.22	.87
28	..	.07	.79	..	..	.05
29	..	..	..	.20	..	1.90
30	..	..	..	.82	.11	.06
31	..	..	..	..	.73	..
Total ..	1.25	1.24	5.77	10.52	5.60	12.58

RAINFALL

at the head of the Waterfall Gardens, Penang, during the second half of the year 1926, in inches.

Readings taken at 8 a.m. and credited to the date in which the twenty-four hours begin. Data kindly supplied by the Municipal Commissioners, George Town, Penang.

Date	July	August	September	October	November	December
1	.10	1.32	1.68	.37	.03	..
2	2.09	1.97	.12	.03	.56	.05
3	..	1.53	.08	.03	.98	.14
4	..	..	2.87	2.67	..	.04
5	..	2.95	.07	2.26	..	..
6	.16	.03	.03	.85	.03	..
7	..	..	.34	1.22	.19	..
8	..	..	1.03	.24	.20	..
9	..	..	1.98	1.65	.90	..
10	..	..	.03	8.25	..	..
11	.03	..	..	.70	..	..
12	.03	1.60	.03	2.26	..	.70
13	.62	.03	.67	2.40	.35	.57
14	..	.03	.39	.04	.53	.88
15	..	.44	..	.04	.30	.19
16	.72	.46	..	..	.09	.20
17	..	..	..	..	.03	..
18	.03	..	.22	3.28	.48	1.94
19	.34	..	..	.04	.42	.20
20	1.33	.04	..	.04	.28	.03
21	.99	..	.55	.05	.09	1.59
22	..	..	.03	..	..	.56
23	.05	.24	.44	.45	..	6.20
24	.10	.67	.99	.34	.04	1.90
25	..	1.67	.05	.19	..	.04
26	..	..	.12	1.49	..	.03
27	..	.05	.35	.09	.88	1.99
28	.10	.36	1.03	.05	1.05	2.16
29	1.05	.53	.04	.03	.58	2.19
30	..	.62	.04	.62	.86	.14
31	.53	2.00	..	.60	..	1.99
Total ..	8.27	16.54	13.18	30.28	8.87	23.73

SUMMARY OF RAINFALL, 1926.

	SINGAPORE				PENANG			
	No. of rainy days	Amount of rain		Longest spell without rain	No. of rainy days	Amount of rain		Longest spell without rain
		inches	mm.			inches	mm.	
January ...	17	6.49	165	9 days	6	1.25	32	8 days
February ...	7	5.70	145	12 ,,	7	1.24	31	13 ,,
March ...	18	3.07	78	3 ,,	10	5.77	147	6 ,,
April ...	15	5.11	130	6 ,,	21	10.52	267	3 ,,
May ...	20	5.31	135	2 ,,	15	5.60	142	5 ,,
June ...	20	8.39	213	3 ,,	20	12 58	320	2 ,,
July ...	19	11.36	289	5 ,,	16	8.27	210	4 ,,
August ...	19	4.76	121	2 ,,	19	16.54	420	5 ,,
September ...	22	13.26	337	3 ,,	24	13.18	335	3 ,,
October ...	20	7.70	196	3 ,,	28	30 28	769	2 ,,
November ...	20	9.08	231	3 ,,	21	8.87	225	3 ,,
December ...	27	10.02	255	1 ,,	22	23 73	603	7 ,,
Total ...	224	90.25	2295		209	137.83	3501	

Greatest amount in 24 hrs.	3.19 ins. or 81 mm.	8.25 ins. or 210 mm.
,, ,,	48 hrs. 4.54 ins. or 115 mm.	9.90 ins. or 251 mm.
,, ,,	72 hrs. 4.58 ins. or 116 mm.	11.21 ins. or 285 mm.
Excessively rainy periods, more than 5 ins. having fallen in 72 hours	—	5 (June, Oct. (2), Dec. (2))
Periods of comparative drought, less than .02 ins. having fallen in 120 hours	10 (Jan. (2), Feb. (3), March, Apr. (2), July, Aug.)	9 (Jan. (3), Feb. (2), March, May, Aug., Dec.).

Departmental Notices.

A list of plants which can be purchased at the Botanic Gardens, in Singapore and in Penang, can be had upon application. The same list appears at intervals in the Government Gazette.

The Gardens' Bulletin is published as material becomes available. Its price is fifty cents for each number, post free, or in advance for every volume of twelve numbers, post free :—

Five dollars in the Straits and Federated Malay States.

Nine and a half rupees in India and Ceylon.

Thirteen shillings in Europe.

Reproduction from it is not prohibited.